TOOELE ARMY DEPOT TOOELE, UTAH

SWMU 2/INDUSTRIAL WASTE LAGOON GROUNDWATER TREATMENT PLANT INFLUENT, EFFLUENT, AND EXTRACTION WELL SAMPLING QUARTERLY REPORT

July 2005

Contract No. DACA05-D-0012 Task Order CM 22 Project No. 1970991.01010401

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LIST OF ACRONYMS

CDQMP Chemical Data Quality Management Plan

CESPK United States Army Corps of Engineers - Sacramento District

EMAX Laboratories, Inc.

IDW investigation-derived waste

MS/MSD matrix spike/matrix spike duplicate

MDL method detection limit

ml milliliter

MWH Americas, Inc.

NOT non-operation test

ORP oxidation-reduction potential

PRAC Pre-placed Remedial Action Contract

QC quality control

RCRA Resource Conservation and Recovery Act

SOW scope of work

SWMU solid waste management unit

TEAD Tooele Army Depot

USACE United States Army Corps of Engineers U.S. EPA U.S. Environmental Protection Agency

USHWCB Utah Solid and Hazardous Waste Control Board

VOA volatile organic analysis VOC volatile organic compound

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1.0 INTRODUCTION

1.0.0.1. This report presents a summary of groundwater monitoring activities performed on 11 and 12 May 2005 by MWH Americas, Inc. (MWH) at the Tooele Army Depot (TEAD) groundwater treatment system. The groundwater samples were collected from eight operating extraction wells and from the groundwater treatment system influent and effluent in accordance with the *Final SWMU 2/Industrial Waste Lagoon System Non-Operation Test Monitoring and Installation-Wide Groundwater Monitoring Plans* (MWH, 2004) and the *Chemical Data Quality Management Plan – Tooele Army Depot*

(CDQMP; U.S. Army Corps of Engineers, 2004).

1.0.0.2. The work summarized in this report was performed pursuant to the U.S. Army Corps of Engineers, Sacramento District (CESPK), Scope of Work (SOW) dated 5 September 2003 (revised 6 August 2004), and was performed under the Pre-placed Remedial Action Contract (PRAC) No. DACA05-99-D-0012, Task Order No. CM22.

1.1 BACKGROUND

1.1.0.1. The Utah Solid and Hazardous Waste Control Board (USHWCB) has issued TEAD a Resource Conservation and Recovery Act (RCRA) Post Closure Permit for post-closure and corrective action of the Industrial Waste Lagoon and other Solid Waste Management Units (SWMUs), hereafter referred to as the Permit (USHWCB, 2001). The groundwater monitoring activities described in this summary report were conducted to comply with the quarterly monitoring requirements described in Module V.D.1.e of the Permit, which requires TEAD to sample groundwater as it enters and exits the groundwater treatment system, and from every active extraction well.

1.2 DOCUMENT ORGANIZATION

1.2.0.1. The remainder of this report consists of:

• Section 2.0 Equipment and Procedures. Describes the equipment and procedures used to collect the groundwater samples.

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- **Section 3.0 Analytical Results.** Presents the laboratory analytical results of the groundwater samples collected on 11 and 12 May 2005.
- Appendix A Field Forms. Includes copies of the Sample Log Forms and Chain-of-Custody Forms
- Appendix B Quality Control Summary Report. Presents the results of the verification and validation of analytical data for the groundwater samples collected on 11 and 12 May 2005.

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2.0 SAMPLING EQUIPMENT AND PROCEDURES

2.0.0.1. This section presents a summary of the equipment and procedures used to collect groundwater samples at the TEAD groundwater treatment system on 11 and 12 August 2005 and includes: 1) field documentation procedures; 2) sample collection equipment and procedures; 3) sample labeling, chain-of-custody, handling and shipping procedures; and 4) procedures for handling the investigation-derived wastes (IDW).

2.1 FIELD DOCUMENTATION PROCEDURES

2.1.0.1. All pertinent sampling information was recorded on field forms including Sample Log Forms and Chain-of-Custody Forms. Information included on the Sample Log Form included weather conditions, sampling personnel, sample location, sample time, sample type, and the measured general water-quality parameters. Information included on the Chain-of-Custody Form included project identification, project location, sample designation, analysis type, sample collection date and time, and signatures of the persons relinquishing and receiving samples. The completed field forms for the 11 and 12 May 2005 sampling round are included in Appendix A.

2.2 EXTRACTION WELL AND TREATMENT SYSTEM INFLUENT AND EFFLUENT SAMPLING

2.2.1 Locations and Rationale

2.2.1.1. The extraction wells and treatment system influent and effluent were sampled in accordance with the quarterly monitoring requirements described in Module V.D.1.e of the Permit, which requires TEAD to sample groundwater as it enters and exits the groundwater treatment plant, and from every active extraction well. On 11 and 12 May 2005, eight groundwater extraction wells were operating and sampled. The eight groundwater extraction wells were operating in accordance with the *System Non-Operation Test Proposal, Implementation of Alternative Measures Industrial Waste Lagoon* (NOT Proposal; URS, 2003), and the approved changes to the NOT Proposal

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described in Appendix D of the Final SWMU 2/Industrial Waste Lagoon System

Non-Operation Test Monitoring and Installation-Wide Groundwater Monitoring Plans

(MWH, 2004).

2.2.2 Equipment and Procedures

2.2.2.1. The discharge pipe at each extraction well-head and the influent and effluent

pipes at the treatment system building are equipped with sample faucets. Prior to

collecting each sample, the faucet was opened to allow a minimum of 0.5 gallon of water

to purge the faucet. After the faucet was purged, the flow was reduced to approximately

100 milliliters (ml) per minute and the volatile organic analysis (VOA) sample containers

were filled directly from the faucet.

2.2.2.2. The water samples were collected in pre-preserved 40-ml amber glass containers

provided by the laboratory. The sample containers were labeled with the date, time,

sample designation, project name and required analysis immediately prior to collecting

the samples. The sample containers were filled so that there was no headspace and no air

bubbles.

2.2.2.3. Immediately after sample collection, the sample containers were placed in an

ice-packed cooler and maintained at 4 +2 °C. Sample labeling, chain-of-custody, and

shipping procedures are described in Section 2.3.

2.2.2.4. After each sample was collected, additional water was retained from the faucet

for general water-quality field measurements. A field-portable Quanta Water Quality

Meter was used to measure pH, specific conductivity, temperature, turbidity, dissolved

oxygen, and oxidation-reduction potential (ORP) of the sampled water. The

water-quality meter was calibrated daily according to the manufacturer's instructions.

All calibration information and water quality measurements was recorded on the

Sampling Log Forms (refer to Appendix A).

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2.2.3 Quality Control Sample Collection

2.2.3.1. Quality control (QC) samples were collected to validate the groundwater analytical data and field procedures. The QC samples that were collected included trip blank, blind duplicate, and matrix spike/matrix spike duplicate samples. A summary of the QC samples collected during the field program is presented on Table 2-1. The results of the QC samples and their impacts on the overall sample results are discussed in the Quality Control Summary Report contained in Appendix B. The procedures for collecting the required QC samples are discussed below. The QC samples were handled and shipped according to the procedures described in Section 2.3.

2.2.3.2. Trip Blank Samples. Trip blank samples consisted of a set of VOA bottles that were filled by the laboratory with reagent-grade water and accompanied the empty bottle sets to the site. The trip blanks remained unopened during the sampling activities and were handled with the environmental VOA samples during all the sampling activities. The trip blanks were returned to the laboratory in each cooler that contained VOA samples. Trip blanks were used to verify that samples were not contaminated by the sample containers or other samples during transfer to and from the laboratory. Two trip blank samples were submitted during the 11 and 12 May 2005 sampling activities.

2.2.3.3. Blind Duplicate Samples. A blind duplicate is a duplicate sample that is submitted with a fictional sample identification so that the laboratory is unaware the sample is a duplicate. Blind duplicate samples are used to assess the consistency and precision of the laboratory. The blind duplicate sample was collected by alternately filling the environmental sample containers and the blind duplicate sample containers as described in Section 2.2.2. One blind duplicate sample was collected during the 11 and 12 May 2005 sampling activities.

2.2.3.4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples. MS/MSD samples are duplicate samples submitted to the laboratory to measure the efficiency of the analytical method in recovering target analytes from an environmental matrix, as well as the laboratory precision and accuracy. The MS/MSD samples were collected by

alternately filling the environmental sample containers and the MS/MSD sample containers as described in Section 2.2.2. One MS/MSD sample pair was collected during the 11 and 12 May 2005 sampling activities.

2.3 SAMPLE LABELING, CHAIN-OF-CUSTODY, HANDLING AND SHIPPING

2.3.1 Sample Labeling

2.3.1.1. A label was placed on each sample container submitted for analysis and included

the following information:

Project name and location

Sample designation

Date and time of sample collection

Preservative

• Sampler's initials

Requested analyses.

2.3.2 Chain-of-Custody

2.3.2.1. A chain-of-custody form was completed and accompanied each sample cooler

submitted to the laboratory. This form included project identification, project location,

sample designation, and analysis type. In addition, there are spaces for entry of the

sample collection date and time, signatures of the persons relinquishing and receiving

samples, and the conditions of the samples upon receipt by the laboratory. The

completed chain-of-custody forms are included in Appendix A.

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2.3.3 Sample Handling and Shipping

2.3.3.1. After sample collection, each sample container was placed in a cooler that contained sufficient ice to maintain the samples at a temperature of 4 ± 2 °C. Each sample was wrapped separately in "bubble-wrap". Ice was double-bagged in zip-lock bags prevent melt water from contacting the samples. The chain-of-custody record was placed inside a plastic bag, sealed, and placed inside the cooler. The cooler was taped shut with strapping tape and custody seals affixed to the outside of the cooler. All samples were shipped to the laboratory within 24 hours of sample collection via Federal Express priority service to ensure that the samples arrived at the laboratory in time to meet both analytical holding times and the project schedule.

2.4 INVESTIGATION-DERIVED WASTE HANDLING

2.4.0.1. The IDW generated during the 11 and 12 May 2005 sampling round included sample-faucet purge water and miscellaneous disposable sampling equipment (e.g., latex gloves, paper towels, plastic 5-gallon buckets). The water generated while purging the sample faucets was contained in plastic 5-gallon buckets and discharged to the sump that feeds the groundwater treatment plant. The miscellaneous sampling equipment was disposed of as municipal waste in the dumpster at the treatment plant.

TABLE 2-1
SUMMARY OF SAMPLES COLLECTED FROM THE TEAD GROUNDWATER TREATMENT SYSTEM INFLUENT, EFFLUENT, AND EXTRACTION WELLS ON 11 AND 12 MAY 2005

(Page 1 of 2)

Sample Designation (a)	Sample Location/Rationale	Sample Type	Analytes	Method
EXTRACTION WELL GROUNDWA	ATER SAMPLES			
TEAD-05-05-E01-WF	Extraction well E-01. Establish VOC concentrations at this extraction well location.	Environmental	VOCs	EPA Method 8260B
TEAD-05-05-E02.1-WF	Extraction well E-02-01. Establish VOC concentrations at this extraction well location.	Environmental	VOCs	EPA Method 8260B
TEAD-05-05-E02.2-WF	Extraction well E-02-02. Establish VOC concentrations at this extraction well location.	Environmental	VOCs	EPA Method 8260B
TEAD-05-05-S-E02.2-WF	TEAD-05-05-E02.2-WF Duplicate Sample	QC (Blind Duplicate)	VOCs	EPA Method 8260B
TEAD-05-05-E11-WF	Extraction well E-11. Establish VOC concentrations at this extraction well location.	Environmental	VOCs	EPA Method 8260B
TEAD-05-05-E12-WF	Extraction well E-12. Establish VOC concentrations at this extraction well location.	Environmental	VOCs	EPA Method 8260B
TEAD-05-05-E12-WF-MS	TEAD-05-05-E12-WF Duplicate sample.	QC (Matrix Spike)	VOCs	EPA Method 8260B
TEAD-05-05-E12-WF-MSD	TEAD-05-05-E12-WF Duplicate sample.	QC (Matrix Spike Duplicate)	VOCs	EPA Method 8260B
TEAD-05-05-E13-WF	Extraction well E-13. Establish VOC concentrations at this extraction well location.	Environmental	VOCs	EPA Method 8260B
TEAD-05-05-E14-WF	Extraction well E-14. Establish VOC concentrations at this extraction well location.	Environmental	VOCs	EPA Method 8260B

Shading indicates where quality control (QC) samples were collected.

(a) Sample Designation:

WF – Well-head faucet TEAD – Tooele Army Depot MS/MSD – Matrix Spike/Matrix Spike Duplicate INF – Influent EFF - Effluent TB – Trip Blank VOC – Volatile organic compound

TABLE 2-1

SUMMARY OF SAMPLES COLLECTED FROM THE TEAD GROUNDWATER TREATMENT SYSTEM INFLUENT, EFFLUENT, AND EXTRACTION WELLS ON 11 AND 12 MAY 2005 (Page 2 of 2)

Sample Designation (a)	Sample Location/Rationale	Sample Type	Analytes	Method				
EXTRACTION WELL GROUNDW	ATER SAMPLES (continued)							
TEAD-05-05-E15-WF	Extraction well E-15. Establish VOC concentrations at this extraction well location.	Environmental	VOCs	EPA Method 8260B				
TREATMENT PLANT INFLUENT	AND EFFLUENT SAMPLES							
TEAD-05-05-INF-WF	Groundwater treatment plant influent. Establish VOC concentrations in water entering treatment plant.	Environmental	VOCs	EPA Method 8260B				
TEAD-05-05-EFF-WF	Groundwater treatment plant effluent. Establish VOC concentrations in water exiting treatment plant.	Environmental	VOCs	EPA Method 8260B				
ADDITIONAL QUALITY CONTROL SAMPLES								
TEAD-8-3-04-TB01	Trip Blank sample	QC (Trip Blank)	VOCs	EPA Method 8260B				

Shading indicates where quality control (QC) samples were collected.

(a) Sample Designation:

WF – Well-head faucet TEAD – Tooele Army Depot MS/MSD – Matrix Spike/Matrix Spike Duplicate INF – Influent EFF - Effluent

TB – Trip Blank VOC – Volatile organic compound

3.0 ANALYTICAL RESULTS

3.0.0.1. This section presents the laboratory analytical results for the TEAD groundwater

treatment plant influent, effluent, and extraction well samples collected on 11 and

12 May 2005. The groundwater sample analytical results are summarized in Table 3-1,

which includes all analytes detected above their respective analytical method detection

limits (MDLs). All of the analytical data including non-detections and all QC sample

results are provided in Table B-1 located in the Quality Control Summary Report

(Appendix B of this report).

3.1 EVALUATION OF ANALYTICAL DATA

3.1.1 Analytical Laboratory and Quality Assurance Plan

3.1.1.1. All analyses for the water samples collected on 11 and 12 May 2005 were

performed by EMAX Laboratories, Inc. (EMAX), a State of Utah certified and U.S.

Army Corps of Engineers (USACE) approved laboratory. EMAX conformed to the

analytical method requirements, analytical quality control requirements, and instrument

calibration frequency specified in the Chemical Data Quality Management Plan

(CDQMP) Tooele Army Depot (USACE, 2004).

3.1.2 Selection of Analytical Methods

3.1.2.1. The water samples collected on 11 and 12 May 2005 were analyzed for the

volatile organic compounds (VOCs) listed in Table V-2 of the TEAD Post-Closure

Permit by U.S. Environmental Protection Agency (U.S. EPA) Method 8260B. The

complete constituent lists for the VOC analyses are presented in Table B-1 located in the

Quality Control Summary Report (Appendix B of this report).

3.1.3 Validation of Analytical Data

3.1.3.1. The laboratory provided the analytical results in both electronic and "hard copy"

versions. The project chemist reviewed the analytical results to determine if they were

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valid. During the data validation review, the chemist looked at each analyte detected to evaluate if its presence was attributable to environmental conditions, or if it was the result of field or laboratory procedures. Sample results that were affected by either field or laboratory procedures were qualified by the chemist. All data qualifiers, as well as the rationale for using the qualifier, are discussed in the Quality Control Summary Report (located in Appendix B).

3.2 SUMMARY OF ANALYTICAL RESULTS

3.2.0.1. A summary of the detected analytes is presented on Table 3-1. VOCs were detected in the groundwater sampled from each of the eight sampled extraction wells except extraction well E-12. VOCs also were detected in the treatment plant influent sample. No VOCs were detected in the groundwater sampled from extraction well E-12 and no VOCs were detected in the treatment plant effluent. All of the analytical data including non-detections and all QC sample results are provided in Table B-1 located in the Quality Control Summary Report (Appendix B of this report).

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TABLE 3-1
SUMMARY OF ANALYTES DETECTED IN TEAD GROUNDWATER TREATMENT PLANT INFLUENT, EFFLUENT, AND EXTRACTION WELL SAMPLES
COLLECTED MAY 2005
(Page 1 of 3)

	tion Identification uple Identification	E-01 TEAD-05-05-E1-WF	E-02-1 TEAD-11-05-05-E2.1-WF	E-02-2 TEAD-11-05-05-E2-2-WF	E-02-2 Dup TEAD-11-05-05-S-E2-2-W			
Analyte/Methods (Units)	Date Collected	5/12/2005	5/11/2005	5/11/2005	5/11/2005			
Volatile Organic Compoun	ds/SW8260B (μg/l)							
1,1-Dichloroethane		0.53 T	<1.0	0.22 T	<1.0			
Carbon tetrachloride		0.96 T	<1.0	0.58 T	0.49 T			
		21	13	18	17			

μg/l micrograms per liter.

Bold Bolded result indicates positively identified compound.

J Data are estimated due to associated quality control data.

T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.

TABLE 3-1
SUMMARY OF ANALYTES DETECTED IN TEAD GROUNDWATER TREATMENT PLANT INFLUENT, EFFLUENT, AND EXTRACTION WELL SAMPLES
COLLECTED MAY 2005
(Page 2 of 3)

	tion Identification nple Identification	E-11 TEAD-05-05-E11-WF	E-12 TEAD-11-05-05-E12-WF	E-13 TEAD-05-05-E13-WF	E-14 TEAD-05-05-E14-WF			
Analyte/Methods (Units)	Date Collected	5/12/2005	5/11/2005	5/12/2005	5/12/2005			
Volatile Organic Compoun	ds/SW8260B (μg/l)							
1,1-Dichloroethane		<1.0	<1.0	<1.0	<1.0			
Carbon tetrachloride		<1.0	<1.0	<1.0	<1.0			
Trichloroethene (TCE)		8.0	<1.0	3.1	18			

μg/l micrograms per liter.

Bold Bolded result indicates positively identified compound.

J Data are estimated due to associated quality control data.

T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.

TABLE 3-1
SUMMARY OF ANALYTES DETECTED IN TEAD GROUNDWATER TREATMENT PLANT INFLUENT, EFFLUENT, AND EXTRACTION WELL SAMPLES COLLECTED MAY 2005
(Page 3 of 3)

	tion Identification nple Identification	E-15 TEAD-05-05-E15-WF	EFF TEAD-05-05-EFF-WF	INF TEAD-05-05-INF-WF			
Analyte/Methods (Units)	Date Collected	5/12/2005	5/12/2005	5/12/2005			
Volatile Organic Compoun	ds/SW8260B (μg/l)						
1,1-Dichloroethane		<1.0	<1.0	<1.0			
Carbon tetrachloride		<1.0	<1.0	<1.0			
Trichloroethene (TCE)		1.6	<1.0	6.2 J			

μg/l micrograms per liter.

Bold Bolded result indicates positively identified compound.

J Data are estimated due to associated quality control data.

T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.

REFERENCES

- MWH Americas, Inc., 2004. *Tooele Army Depot, SWMU 2/Industrial Waste Lagoon System Non-Operation Test Monitoring and Installation-Wide Groundwater Monitoring Plans*. Prepared for the U.S. Army Corps of Engineers Sacramento District. Final, June 2004.
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 - Utah Department of Environmental Quality Division of Solid and Hazardous Waste, 2001. *Tooele Army Depot Post-Closure Permit.* U.S. EPA Identification Number UT 3213820894. February 12, 2001. World-Wide Web link http://www.hazardouswaste.utah.gov/TEAD.htm

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APPENDIX A FIELD LOG FORMS

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

MWH Phone (801) 617-3200 FAX (801) 617-421 MWH Contact FA: 4 MCC	00 M = -			1-1	<u> </u>	1						***************************************		F	Cooler Page _ Vir Bill	1 01 2
Project 7 EAD		- [ŀ			-	ANALY	SES RI	EQUEST	TED			LABORATORY USE ONLY
ab ID No. Location Field Sa Lab Only) ID BD	A A M S	Date Collected	Time Collected	Sample Number	Matrix	Sampling Technique ^b	VOCs 8260E	Trace Metals (filtered) 6010E/7000	Explosives (8330)						Trip Blank	SAMPLES WERE: 1 Shipped or hand delivered Notes: 2 Ambient or Chilled Notes:
TEAD-11-05-05-4	B-01	3/11/05	1600	1: 1	W	6	X	\neg	+	+	+	_			 F	3 Temperature
TEAD-05-05-03		3/4/05	1015	Z	UE	OF.	X			1	1 1	_	++		+	4 Received Broken/Leaking
and the side of		1 //	1040	3	lė.	"	X			_	╂─┼		++	_	+	(Improperly Sealed) Y N
		5/11/05		4	11	"	X	1	1	1	1		++		+	Notes:
TEAD-05.05-60.	7-C - DF -49			5	11	11	X			1		_	+		+-	5 Properly Preserved
TEAD- 05.05- (17- p	DF- 364	\$1405	1250	6	11	11	X	1		1	1-1		++	\dashv	-	Y N Notes:
TEAD 05 05 - 60-3	F - 357	5/11/05	1315	7	11	"	X	1		1-		_	++	_	-	6 Received Within
TEND-05 05-5-E2	- WE				10	OF)	<				f	-	+	-	╂═┨	Holding Times
TEAD-05.05-E2.	1-10F	411/05		9	11)	1	*					\neg	╅		\vdash	Y N Notes:
TEAD-05.05 1=12	1-WF	111/05	1440	101	1	"	X				 	_	++	_	H	
		1/09		11/1	1	" [Y					_	++		H	COC Tape Was:
	F. MS	44/05	1500	12 1	4	"	X					_	╁┼┼		\vdash	1 Present on Outer Package Y N NA
	WF-MSD	7/05		131	. /	1	V					\dashv	++			Y N NA 2 Unbroken on Outer
E-Sediment AA-Air	EP/TCLP Leachate WQ - Trip Blank, EB - Equipment Blan WW - Wastewater	Compo ks Grab=0 Hand A	G Kuper≂HA	-	S	ladde ubme aller=	usibie	np=BF Pum	» P=SP	············	SPE	CIAL IN	STRUCTI	ONS:		Package Y N NA 3 Present on Sample
elinquished by/Affiliation Received	by/Affiliation		Diffusion B	ag=DF	V	/el-H	ead F	aucet	-WF							Y N NA
umi Paam / most P	YOX		inne R	upnile	ishe	d by/	Affilia	ation	Ru	ocived	byiAH	Mation	Date	Ti	me	4 Unbroken on Sample Y N NA Notes:
					•											Discrepancies Batween Sample Labels and COC Record?

N

Notes:

פווטחטוספונוניזה

DTW Borehole D	ng Personnel:	Dennis Adan DTP	ns/David imi	Produ			Suface Wat Start Time Me gallons	1400 asuring Point	Groundwater X Finish Time 1931
Sampling I Dedicated I Dispo	Bladder Pump osable Bailer	Dedicated Sut	Portable 8	Bl a dder Pump b	Other	Surge/Ba		PDB Surge Block	k Type
Time (military)	Temp (C)	SC (umhos/cm)	, ump sto D.O. (mg/L)	Para	meters Tak EH-ORP	Turbidity		_ Organic Var Voi Evac.	vopr at Wellhead
1408	18.95	2450	4.11	7.13	(millivolts)	5.9	Flow Rate	(gal.)	Comments
		-							
Final									
Time (military)	рН 1 <u>4.4-3</u> 7./3	SC (umhos/cm) <i>8450</i>	Temp (C)		D.O. (mg/L) Y·//	Turbidity (NTU)	Flow Rate	Voi Evac. (gal.)	Comments
Time		(umhos/cm)		(millivolts)	(mg/L)	(UTU)			Comments
Time (military) Comments netrumentalo	9./5 9./5	(umhos/cm) 3450 Quanta	#:## 9.93 Eh	(millivoits)	(mg/L.) Y • / /	S. 9	Flow Rate	(gai.)	Other
Time (military) Comments natrumentalo calibration: p	7./5	(umhos/cm) 3450 Quanta	### 18.93 Ehl	(millivolts) -/ \$5 Hydrolab Data: Reference	(mg/L) Y·//	(NTU)	Flow Rate	(gai.)	Other
Time (military) Comments Instrumentalo Calibration: p Turb ample ID: Tamples Collection	on: oh Buffers oldity Reference	Quanta Quanta Quanta Co Solution C's 8260B	Eh 1	Hydrolab Data: Reference	eonde4	on Time:	Horiba U22	(gai.)	Other
Time (military) Comments Instrumentalo calibration: p Turb ample ID: Turb camples Collecte metals	on: oh Buffers oldity Reference	Quanta Quanta Quanta Co Solution Co \$260B SVOC's	Eh 1	Hydrolab Data: Reference	eonde4	on Time: TOC PH Gas	Horiba U22SC Re	(gai.)	Other
Time (military) Comments natrumentalo calibration: p	on: oh Buffers oldity Reference	Quanta Quanta Quanta Co Solution C's 8260B SVOC's Anions/Alkalir	Eh 1	Hydrolab Data: Reference	conde4	on Time: TOC PH Gas	Horiba U22	(gai.) Preference:	Other

			_ Sample L	ocation	TE.	ADN	Suface Wat	ter	Groundwater)
Sampling Pel	sonnel: Di	ennis Adam	s/David Imla		5-11-				Groundwater Finish Time
DTWBorehole Dia.		DTP	***************************************	Produ	t Thickness		Me	asuring Point	- D
DOINTION DIA		Total (Casing Depth	<u> </u>	Purge Volu	me	galions	Weather	Wiede Pain.
Sampling Metho	di Da	dia=4- d O . l			11/0				
		iicated Sub	mersible Pu	m <u>e</u>	WE	Pabls	1	PDB	
Dedicated Bladds	er Fump		Portable B	ladder Pump		Surge/Bail		Surge Block	k Type
Disposable Dimo Stadad	Bailer	***************************************	Grab		Other				
Pump Started			_Pump Stop			Total Gallo	ns	Organic Va	vopr at Wellhead
Time		SC	D.O.	rara	meters Take EH-ORP	n Turbidity			
(military) Ten	np (C) (u	mhos/cm)	(mg/L)	pН	(millivolts)	(NTU)		Vol Evac. (gal.)	C
1435 1	<u>r./3</u>	730	5.54	7.46		2.2	1 1011 11210	(gai.)	Comments
								-	·
								-	
	·								
									
								_	
								-	
Time ph		sc		EH-ORP	D.O.	Turbidity		Voi Eugo	
Time ph	luma	hos/cm)	Temp (C)	(millivolts)	(mg/L)	Turbidity (NTU)	Flow Rate	Voi Evac.	Comments
Time ph	luma	hos/cm)	Temp (C)	(millivolts)			Flow Rate	Vol Evac. (gal.)	Comments
Time ph military) 435 7/9	luma	hos/cm)	Temp (C)	(millivolts)	(mg/L)	(NTU)	Flow Rate		Comments
Time ph military) 435 7/9	luma	hos/cm)	Temp (C)	(millivolts)	(mg/L)	(NTU)	Flow Rate		Comments
Time pholitary) 1957/9	luma	hos/cm)	Temp (C)	(millivolts)	(mg/L)	(NTU)	Flow Rate		Comments
Time pholistary) 1957/9 mments	luma	hos/cm)	Temp (C)	(millivolts)	(mg/L)	(NTU)	Flow Rate		Comments
Time pholistary) 1957/9 mments	(umt	hos/cm)	18./5	(millivolts) - 207	(mg/L) 5.54	(NTU)	Flow Rate		
Time pholips p	(umt	nos/om)	18.75 V H	(millivolts) - 207	(mg/L) 5. 5 4 onde4	(NTU) 2 . 2 .	Flow Rate		Comments
Time pholips p	(umt	hos/om)	18.75 V H	(millivolts) - 207	(mg/L) 5. 5 4 onde4	(NTU) 2 . 2 .	Flow Rate	(gal.)	Other
Time philitary) 1/3 5 7/9 mments trumentaion: ibration: ph Buff	(umt 17.	Quanta	18./5 H	(millivolts) 207 Iydrolab Datas	(mg/L) 5. 5 4 onde4	(NTU) 2 . 2 .	Flow Rate		Other
Time philitary) 1/3 5 7/9 mments trumentaion: ibration: ph Buff	(umt	Quanta	18./5 H	(millivolts) - 207	(mg/L) 5. 5 4 onde4	(NTU) 2 . 2 .	Flow Rate	(gal.)	Other
Time philitary) 19 5 7.9 mments trumentaion: ibration: ph Buff	iers	Quanta	18.15 H Eh R	(millivolts) July lydrolab Datas deference	(mg/L) 5. 5 4 onde4	(NTU) 2.2	loriba U22	(gal.)	Other
Time philitary) 19 5 7.9 Imments trumentalon: Ibration: ph Buff Turbidity R	iers	Quanta	18.15 H Eh R	(millivolts) July lydrolab Datas deference	(mg/L) 5. 5 4 onde4	(NTU) 2.2	Flow Rate	(gal.)	Other
Time pholitary) 19 5 7.9 mments trumentalon: ibration: ph Buff Turbidity R	iers	Quanta Quation	18.15 H Eh R	(millivolts) lydrolab Datas deference TU's	(mg/L) 5. 5 4 onde4	(NTU) 2.2 H	loriba U22SC Re	eference: /s	Other
Time philitary) 19 5 7.9 Imments trumentalon: Ibration: ph Buffl Turbidity R Inple ID: TEAL	iers Voc's 8	Quanta	18.13 Eh R	lydrolab Datas Reference A TU's Samp	(mg/L) 5. 5 4 onde4	(NTU) 2.2	loriba U22SC Re	(gal.)	Other
Time philitary) 19 5 7.9 Imments trumentalon: Ibration: ph Buffl Turbidity R Inple ID: TEAL	iers Voc's 8	Quanta Quation	18.13 Eh R	(millivolts) lydrolab Datas deference TU's	onde4	(NTU) 2.2 H	loriba U22SC Re	eference: /s	Other
Time philitary) 1/3 5 7.9 mments trumentalon: ibration: ph Buff Turbidity R pple ID: ZEA	iers Voc's 8	Quanta Qu	Eh R	Iydrolab Datas Seference TU's Samp Sulfide Explosives	onde4	(NTU) 1 Time: TOC PH Gas	flow Rate	eference: /s	Other
Time philitary) 1957 Tomments trumentalon: ibration: ph Buff Turbidity R hple ID: TEAL inples Collected: metals	iers Voc's 8	Quanta	Eh R	Iydrolab Datas Seference TU's Samp Sulfide Explosives	onde4	(NTU) 1 Time: TOC PH Gas	loriba U22SC Re	eference: /s	Other
military) 935 7.9 mments trumentaion:	iers Voc's 8	Quanta		Iydrolab Datas Seference TU's Samp Sulfide Explosives	onde4	H Time: TOC PH Gas	flow Rate	eference: /s	Other
Time phinilitary) 1/3 5 7/9 Primments Primments Primments Primments Turbidity R Primple ID: Tender Primples Collected: Primer ID: Tender Primples Collected: Primer ID: Tender Primples Collected: Primer ID: Tender Primples Collected:	iers Voc's 8	Quanta	Eh R	Iydrolab Datas Seference TU's Samp Sulfide Explosives	onde4	H Time: TOC PH Gas	flow Rate	eference: /s	Other

				ocation		ADN	_Suface Wat	er	Groundwater)
DTW	ig Personnel;	Dennis Aden					Start Time	1445	Finish Time 15
Borehole D					ct Thickness		Me	asuring Point	
	'''		Casing Depth	1	Purge Vol	um <u>e</u>	gallons	Weather	Rainn, Winds
Sampling I	Method:	Dedicated Sul	hmareihia Du	ma	111 5	Oable			
)	Podeble D	ladder Duma	V			PDB	
Disp	osable Bailer		Grab	nacuel rump		Surge/Bail		_Surge Block	k Typė
Pump Start			Pump Stop		_ Other	Total Gallo			
					meters Tak	en	n <u>s</u>	_Organic Va	vopr at Weilhead
Time (military)	Temp (C)	SC (umhos/cm)	D.O.		EH-ORP	Turbidity		Vol Evac.	
1448	21.57	3840		PH سے یہ ج	(millivoits)	(NTU)	Flow Rate	(gal.)	Comments
			4.11	7.75	-110	8./			
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nal									···
Time	pH	sc		EH_ORP	DΟ	Translation.			
Time	ا سرسانسا	SC (umhos/cm)	Temp (C)	EH-ORP (millivolts)	D.O. (mg/L)	Turbidity (NTU)		Vol Evac.	0
Time	ا سرسانسا	(umhos/cm)	Temp (C)	(millivolts)	D.O. (mg/L)		Flow Rate	Vol Evac. (gal.)	Comments
Time nilitary) Y-4 8	ا سرسانسا	(umhos/cm)	Temp (C)	(millivolts)	(mg/L)	•			Comments
Time nilitary) Y-4 8	ا سرسانسا	(umhos/cm)	Temp (C)	(millivolts)	(mg/L)	•			Comments
Time nilitary) Y-4 8	ا سرسانسا	(umhos/cm)	Temp (C)	(millivolts)	(mg/L)	•			Comments
Time nilitary) Y4 \$ mments	7.75	(umhos/cm)	Temp (C)	(millivolts)	(mg/L)	•			Comments
Time military) Y4 \$ mments	7.75	(umhos/cm)	3/.57	(millivolts)	(mg/L) 8.98	(ALTO)			
Time nilitary) Y	7.75 ((umhos/om) 3 8 4 0	2/.57	(millivolts) -/70	(mg/L) 8 - 9 8	(MTV)	Flow Rate		Comments
Time nilitary) Y	7.75 ((umhos/om) 3 840	2/.57	(millivolts) -/70	(mg/L) 8.98	(MTV)	Flow Rate	(gal.)	
Time nilitary) mments trumentaio	7.75	(umhos/om) 3 8 4 0 Quanta_	3/.57 Eh F	(millivolts) -/7/ -/7/ Hydrolab Datas	(mg/L) 8 - 9 8	(MTV)	Flow Rate	(gal.)	Other
Time nilitary) mments trumentaid libration: p	7.75	Quanta_	2).57 Eh F	(millivolts) // 7/D Hydrolab Datas Reference	(mg/L) 8 - 9 8	(MTV)	Flow Rate	(gal.)	Other
Time nilitary) mments trumentaid libration: p	7.75	(umhos/om) 3 8 4 0 Quanta_	2).57 Eh F	(millivolts) -/7/ Hydrolab Datai	(mg/L) 8.98 sonde4 AH/ pH	(MTV) 1	oriba U22 _	(gal.)	Other
mments	7.75 on: oh Buffers oldity Reference	Quanta	2).57 Eh F	(millivolts) -/7/ Hydrolab Datai Reference ITU's Samp	(mg/L) 8 - 9 8	H	Flow Rate	(gal.)	Other
Time military) WYYS truments trumentaid libration: p	7.75 on: oh Buffers oldity Reference	Quanta_	2).57 Eh F	(millivolts) -/7/ Hydrolab Datai	(mg/L) 8.98 sonde4 AH/ pH	(MTV) 1	oriba U22 _	(gal.)	Other
military) 448 mments trumentaid ibration: p	7.75 on: oh Buffers oldity Reference	Quanta	2).57 Eh F	(millivolts) -/7/ Hydrolab Datai Reference ITU's Samp	sonde4	n Time:	oriba U22 _	(gal.) eference:	Other
mments	7.75 on: oh Buffers oldity Reference	Quanta Quanta 7//0 De Solution C's 8260B SVOC's	2).57 Eh F 0 N	(millivolts) -/7/ Hydrolab Datai Reference ITU's Samp	sonde4	H	oriba U22 _	(gal.)	Other
Time military) mments trumentaid libration: p Turb nple ID: 7 iples Colle metals	7.75 on: oh Buffers oldity Reference	Quanta	2).57 Eh F 0 N	(millivolts) 170 Hydrolab Datai Reference ITU's Samp Sulfide Explosives	sonde4	n Time:	oriba U22 _	(gal.) eference:	Other
trumentaid ibration: p Turb ple ID: 7 relas Colle metals chlorate	7.75 on: oh Buffers oldity Reference	Quanta Quanta Quanta Coe Solution Coe Solution Coe Solution Coe Solution Anions/Alkalin	2).57 Eh F 0 N 112 - W J	(millivolts) 170 Hydrolab Datai Reference ITU's Samp Sulfide Explosives	sonde4 AH/ PH BEEXN	INTU) H In Time: TOC PH Gas TP	oriba U22SC Re	(gal.) eference: Cations Dioxins	Other
Time military) www. mments trumentaid libration: p Turb nple ID: 7 nples Colle metals	7.75 on: oh Buffers oldity Reference	Quanta Quanta Quanta Coe Solution Coe Soluti	2).57 Eh F 0 N	(millivolts) 170 Hydrolab Datai Reference ITU's Samp Sulfide Explosives	sonde4 AH/ PH BEEXN	n Time:	oriba U22SC Re	(gal.) eference: Cations Dioxins	Other

CHAIN OF CUSTODY RECORD/LAB WORK REQUEST

### AMALYSES REQUESTED AMALYSES REQUESTED LABORATORY USE ONLY	LABORATORY EM	,				-			'/ han!"	10	VVC	JKr	V IXI	EW	UE	51		Co Pa	oler ge _	of Custody ID C ID 120505 DH 01 of 3 No. 79106969 1156
AMALYSES REQUESTED LABORATORY USE ONLY Project I (LAB D) No. Location (Phone (801) 617-3208 FAX	(801) 617-42ng		1		т –	_												APRE	
Project Mumber 19 10 9 9 10 10 10 10 10 10 10 10 10 10 10 10 10	MWH Contact / A	& Moore			ı						AN	IALYS	ES RI	FOU	STE	`		-		
Date	Project 7 F. FID	•	_			'		\vdash	T -	Г		_								LABORATORY USE ONLY
Date	Project Number 19704	91. 0101040Z	_				9	l	9											CAMPA FOREST
TEAD - 0.5 0.5 - E15 - WF	Date Due / An	dard	1 3	1 2	¥		Į	l	1	8		1								!!
TEAD - 0.5 0.5 - E15 - WF	Samplers Signature D Y	Anis Adams	_ 👸	=	Ē		ž	9	90	63					1					
TEAD - 0.5 - 0.5 - E1.5 - WF 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5	Lab ID No. Location	Field Sample Darth	٦ ٥	ပိ	200	2	Ē	23	¥ S	Ske	l								Ę	
TEAD - 0.5 - 0.5 - E1.5 - WF 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5 1/2 - 0.5 - 1/2 1/2/0.5	(Lab Only) ID			ĮĚ	Ē	1	Ē	Ö	25	ä	1						-		ä	
TERD - 0.5 0.5 - F1.5 WF	120	OSTROL	-71				L		E&	a									Trip	
TEAD - 0.5 - 6.5 - 6.0 - 9 - 3.9 Table 10.0 3 1 1 1 1 1 1 1 1 1	45 An- 0	FOR EIGHT	3/0	5 90																11
TEAD - 0.5 - 0.5 - 806 - 0 = -347 fuls 101.5 4 166 0F X	9645	25-673-WF		5 74	02	We	10	\mathcal{X}												4 Received Broken/Leaking
	TEND OF	P.OS. EIN-WE		\$ 1000	2 3	11	"	V												
	1FM D-03-	03-806-DE-397	1/12/0	5 101	5 4	16	DF.	¥												11
	1FAD-05	15-TO6-DE-361	1/12/-	5 103				Ŷ							-					5 Properly Preserved
TEAD - 05 - 05 - E 5 - W = \$\frac{1}{2}\frac{1}{5}\frac{1}{1}\frac{1}{5}\frac{1}{1}\frac{1}{5}\frac{1}{1}\frac{1}{5}\frac{1}{1}\frac{1}{5}\frac{1}{1}\frac{1}{5}\frac{1}{1}\frac{1}{5}\frac{1}{1}\frac{1}{5}\frac{1}{1}\frac{1}{5}\frac{1}{1}\frac{1}{1}\frac{1}{5}\frac{1}{1}\frac{1}{1}\frac{1}{5}\frac{1}{1}\frac{1}{1}\frac{1}{5}\frac{1}{1}\frac{1}{1}\frac{1}{5}\frac{1}{1}\frac{1}{1}\frac{1}{5}\frac{1}{1}\frac{1}{1}\frac{1}{5}\frac{1}{1}\frac{1}{1}\frac{1}{5}\frac{1}{5}\frac{1}{1}\frac{1}{1}\frac{1}{5}\frac{1}{5}\frac{1}{1}\frac{1}{1}\frac{1}{1}\frac{1}{5}\frac{1}{5}\frac{1}{1}\frac{1}{1}\frac{1}{1}\frac{1}{5}\frac{1}{5}\frac{1}{1}\frac{1}{1}\frac{1}{1}\frac{1}{5}\frac{1}{5}\frac{1}{1}\frac{1}{1}\frac{1}{1}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}\frac{1}{5}\frac{1}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}\frac{1}{5}\frac{1}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\frac{1}{5}\	7EAD-05	45-836-05-224		dine	1/2	"	· ·					\vdash								N Y
TEAD - 0.5 - 0.5 - ET - W F 1/2 1/	1.5 AD C5-6	15-E15- WI	5/26	1/0	2 10			<i>5</i>	\dashv											11
TEAD - 05 - 05 - EI - W F	TEAD-05.	5-E11-11E	5/1	2 1100				X.								1				6 Received Within
TEAD - 05 - 05 - EFF - WF 13/05 1345 10 11 11 X	TEAD-05.	25 FI-10 F	3/13	1//:		_	14	X												
TEAD - 5 - 5 - EFF - UF	4Fdn - 05.	2000	7/3/0	5 1/20		11	11	X												11
Coc Tape Was: 1 1 1 1 1 1 1 1 1	TENO -	03-LNF-101	1/2/00	5/24		11	11	X												
Present on Outer Peckage	1640.05	03-EFF-WF	1/12/2	- 141.	011	11	1/	Y		_				-						COC Tape Was:
Matrix: SO - Soil LF - Product SE - Sediment AA - Air WS - Surface Water WS - Surface Water WS - Wipe WS -	15AU-05-0	5-62 - 75-362	1/2/0:	1341	2/2		ne	SI	一十	\dashv			-							1 Present on Outer Package
SSO Soil LF - Product WQ - Trip Blank, SE - Sediment AA - Air BB - Equipment Blanks WW - Wastewater WW - Wastewater B- Hand Auger=HA Beiler=B WW - Wastewater	11/240-03-6	13- C35 DF - 321	17/2/2	- 1400	2 12	"	".	() 	\dashv					\dashv		_				N NA
SE - Sediment AA - Air EB - Equipment Blanks WS - Surface Water SW - Wipe EB - Equipment Blanks WW - Wastewater EB - Equipment Blanks WW - Wastewater EB - Equipment Blanks WW - Wastewater EB - Equipment Blanks Grab=G Submersible Pump=SP Submersible Pump=SP Bailer=B Submersible Pump=SP Well-Head Faucel=WF Reflinquished by/Affiliation Received by/Affiliation Date Time Reflinquished by/Affiliation Received by/Affiliation Date Time Discrepancies Between Sample Labels and COC Record? Y N NA NA NA Notes: Discrepancies Between Sample Labels and COC Record? Y N NA NA Notes:	"matrix: WG - Gro	und Water EP/TCLP Leachate	• Sa	noling Toc	7 17 31	<u>"</u>	<u>"</u>													2 Unbroken on Outer
Relinquished by/Affiliation Date Time Received by/Affiliation Date Time Discrepancies Between Sample Labets and COC Record? Y N N	SE - Sediment AA - Air	uci WQ - Trip Blank,	Con	nposite=C	unnelne.		Black	der Pı	nn=R	go.			SPE	CIAL	. INST	RUC	TION:	S:		
Relinquished by/Affiliation Received by/Affiliation Date Time Relinquished by/Affiliation Date Time Notes: Passive Diffusion Bag=DF Well-Head Faucet=WF Well-Head Faucet=WF	WS - Surface Water SW - Wip	6 WW - Wastewater					Subr	nersib	le Pun	- np≕SI	P									1
Received by/Affiliation Received by/Affiliation Date Time Relinquished by/Affiliation Received by/Affiliation Date Time Y N NA Notes: Discrepancies Between Sample Labels and COC Record? Y N			Pas	sive Diffusi	on Bao≕i	DF			-		_									1
Neama (10 Mas / 1985) From 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Received by/Affiliation					-	-												1""
Discrepancies Between Sample Labels and COC Record? Y N	Diamis Adamston				Kelino	ulsh	ed b	ylAffi	iation	1	Rec	bevie	by/A1	filiati	on	De	te	Tin		1 3
Sample Labels and COC Record? Y N	- Francisco (1844)	1 4/14/2	11403	1600															\dashv	
Sample Labets and COC Record? Y N																			\dashv	Disamo
Record? Y N							-			1							-		_	Sample Labels and COC
										+			·						\Box	Record?
		e e e e e e e e e e e e e e e e e e e								+										Y N

Project No	o: <u>1970</u> (91.010104 <i>0</i> 2	Sample Loc	ation	TE	ADN	Suface Wat	ter	Groundwater x
Sampl	ling Personnel	Dennis Aden	ns/David Imlay	Date:	5-12	05		430	Groundwater X Finish Time 750
ידם	W_	DTF	•	Produc	Thickness	0		asuring Point	730
Borehole	Dia.	Total (Dasing Depth_	0	Purge Volu	ime	gellons	Weather	Pratty Hovdy
								7,00,00	ZEELIN CITY OH
,	Method:	Dedicated Sui	omersible Pum	ρ	WF	Cabis	1	DUB	
Dedicated	Bladder Pum)	Portable Bia	dder Pump	• • •	Surge/Bail		Surge Bloc	
Disp	posable Bailer				Other	G		_ odige bioc	K Type
Pump Star	rted		Pump Stopp		•	Total Gallo	ons	Organic Va	vopr at Wellhead
Time		sc		Paran	neters Take	en		Organio va	Aobi at Aneillead
(military)	Temp (C)		D.O.	ρΗ	EH-ORP	Turbidity		Vol Evac.	
935		1810	1335	7.59	(millivoits)	(NTU)	Flow Rate	(gal.)	Comments
				7.75		16.4			

				-					
								-	
	-						-		

							**********	-	
	-								
			-						
Final Time	_11								
(military)	рН	SC (umhos/cm)		H-ORP		Turbidity		Vol Evac.	
935	7.85		Temp (C) (n	niiivoits)	(mg/L)	(NTU)	Flow Rate	(gal.)	Comments
					7.93	16.4			
Comments									
,									
				······································					
instrumental	lon:	O	-						
		Quanta	Hy	drolab Dataso	onde4	н	loriba U22 _		Other
Calibration:	ph Buffers '	7/10	Fh Re	ierence D	41.4			_	
		7		ference	7 1011		SC Re	eference:/	4/3 umhos
Tur	rbidity Referen	ce Solution	ONTI	J's					
Samula ID. 2	5442 A		1.0						
Sample ID: 2	PAD-US	1-05-E	3-WF	Sample	Collection	n Time:	940		
Samples Coll	ected: VO	C's 8260B		Sulfide	 -,				
				Sunde		тос		Cations	
ace metals		SVOC's	Ex	olosives	TF	PH Gas		Dioxins	
Perchlorate		Anions/Alkalin						-1071110	
-				B	TEXN	TP	H Diesel		
TSS		Bicart	conates		Nitrates	/Nitites			ulfites
MS/MSD	BD	•	Γ	TB cz	iladi				
				10 C]	

Project No:					TE		Onince AASI	or	Groundwater X
		Dennis Adam		•	5-13		Start Time	950	Finish Time 100
Borehole D			<u> </u>		t Thickness		Me	asuring Point	0
Borenoie D	14. 11.	_ lotal C	Casing Depth_	<u>e</u> _	Purge Volu	ıme 🖋	gallons	Weather	e ·
Sampling I	Method:	Dedicated Sub	mersible Pumr	^	n . f.)	حرونطف منا			
,	Bladder Pump		Portable Blac	der Pump	μ,		-	_ PDB	
Dispr	osable Bailer		Grab	ader rump	Other	Surge/Bai		_Surge Block	k Type
	ed		Pump Stoppe		- 00161	Total Gall		O	. 166
				Para	meters Take	eu Bu	J118	Organic va	vopr at Wellhead
Time (military)	Temp (C)	SC (umhos/cm)	D.O.		EH-ORP	Turbidity		Vol Evac.	
955	17.75			pH	(millivolts)		Flow Rate	(gal.)	Comments
	11.10	1770	3.77	7,37	-186	3.5			<u> </u>
					-				
				-					
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							The state of the s		
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						1			
Final						1			
Time	рН	sc		H-ORP	D.O.	Turbidity		Vol Evan	
Time (military)		umhos/cm)	Temp (C) (m	rillivolta)	(mg/L)	Turbidity (NTU)	Flow Rate	Vol Evac.	Comments
Time (military)			Temp (C) (m		(mg/L)			Vol Evac. (gal.)	Comments
Time (military) 955		umhos/cm)	Temp (C) (m	rillivolta)	(mg/L)	(NTU)			Comments
Time (military) 955		umhos/cm)	Temp (C) (m	rillivolta)	(mg/L)	(NTU)			Comments
Time (military) 955		umhos/cm)	Temp (C) (m	rillivolta)	(mg/L)	(NTU)			Comments
Time (military) 955 Comments	7.39	umhos/cm) 4440	Temp (C) (m	nillivolte) / \$C	(mg/L) 5: 7 9	(NTU)			Comments
Time (military) 955	7.39	umhos/cm)	Temp (C) (m	rillivolta)	(mg/L) 5: 7 9	(NTU)			Comments
Time (military) 955	7.39 7.39	umhos/cm) 4440 Quanta	Temp (C) (m	nillivoita)	(mg/L) \$.77	(NTU) 3.5	Flow Rate		
Time (military) 955	7.39 7.39	umhos/cm) 4440	Temp (C) (m	nillivoita)	(mg/L) 5: 7 9	(NTU) 3.5	Flow Rate	(gal.)	
Time (military) 955	7.39 7.39	Quanta_	Temp (C) (m	drolab Datas	(mg/L) \$.77	(NTU) 3.5	Flow Rate	(gal.)	Other
Time (military) 955 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	7.39	Quanta Quanta Se Solution	Temp (C) (m	drolab Datas	(mg/L) \$.77	(NTU) 3.5	Flow Rate	(gal.)	Other
Time (military) 955	7.39	Quanta Quanta Se Solution	Temp (C) (m	drolab Datas	(mg/L) 5 : 9 9 conde4	(NTU) 3.5	Flow Rate	(gal.)	Other
Time (military) 955	n: h Buffers idity Reference	Quanta Quanta Solution	Temp (C) (m 7.75 Hyo Eh Refi	drolab Datas	(mg/L) \$.77	(NTU) 3.5	Flow Rate	(gal.)	Other
Time (military) 955	n: h Buffers idity Reference	Quanta Quanta Se Solution	Temp (C) (m 7.75 Hyo Eh Refi	drolab Datas	(mg/L) 5 : 9 9 conde4	(NTU) 3.5	Flow Rate Flow Rate Flow Rate Flow Rate	(gal.)	Other
Time (military) 955	n: h Buffers idity Reference	Quanta Quanta Solution	Temp (C) (m	drolab Datas ference	(mg/L) 5: 97 conde4 RH/p/A	(NTU) 3. 5	Flow Rate	eference: /	Other
Time (military) 955	n: h Buffers didity Reference CEAD ~ 000	Quanta Quanta Quanta Se Solution Se \$2608 SVOC's	Temp (C) (m 7.75 Hyo Eh Refi	drolab Datas ference Samp Sulfide	(mg/L) S: 99	(NTU) 3.5	Flow Rate	eference: /	Other
Time (military) 955 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	n: h Buffers didity Reference CEAD ~ 000	Quanta	Temp (C) (m 7.75 Hyo Eh Refi	drolab Datas ference Samp Sulfide	(mg/L) 5: 97 conde4 RH/p/A	n Time:	Flow Rate	eference: /	Other
Time (military) 955 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	n: h Buffers didity Reference CEAD ~ 000	Quanta Quanta Quanta Solution Solution Solution Solution Anions/Alkalini	Temp (C) (m 7.75 Hyo Eh Refi NTL 14-WE Exp	drolab Datas ference Samp Sulfide	ionde4 CH/p/A	TOC TF	Flow Rate Flow Rate Flow Rate	eference: /	Other
Time (military) 955	h Buffers	Quanta Quanta Quanta Solution Solution Svoc's Anions/Alkalini	Temp (C) (m 7.75 Hyo Eh Refi	drolab Datas ference Samp Sulfide	(mg/L) S: 99	TOC TF	Flow Rate Flow Rate Flow Rate	eference: /	Other
Time (military) 955	n: h Buffers didity Reference CEAD ~ 000	Quanta Quanta Quanta Solution Solution Svoc's Anions/Alkalini	Temp (C) (m 7.75 Hyo Eh Refi NTL 14-WE Exp	drolab Datas ference Samp Sulfide	ionde4 CH/p/A	TOC TF	Flow Rate Flow Rate Flow Rate	eference: /	Other

Project No: 197091	91.010104	Sample Location	TEADN	_Suface Water	r G	roundwater X
Sampling Personnel:		avid imlay Date		Start Time		roundwater X Finish Time ///0
DTW	_ DTP _	Produ	ct Thickness		suring Point	A 1110 1110
Borehole Dia.	_ Total Cas	ing Depth	Purge Volume	gailons		hede. leo /
Sampling Method:	Dodina do de		1.12			
Dedicated Bladder Pump	Dedicated Subme		WF Calor	<u> </u>	PDB_	
Disposable Bailer	٢	ortable Bladder Pump			Surge Block T	уре
Pump Started		Grab_ ump Stopped	Other			
			Total Galli ameters Taken	on <u>s</u>	Organic Vavor	or at Wellhead
Time (military) Temp (C)	SC (umhos/cm)	D.O.	EH-ORP Turbidity		Vol Evac.	
		(mg/L) pH 1.04 7.96	(millivolts) (NTU)	Flow Rate	(gal.)	Comments
	1000 11	1.16	-0/2 3/			
				-		
	- Landau					
: /						
Final						
Time pH	sc	FU ODD				
(military) (u	imhos/cm) Ten	EH-ORP np (C) (millivoits)	D.O. Turbidity (mg/L) (NTU)		ol Evac.	
1055 7.96			11.04 3.1	LIOM LAIG	(gal.)	Comments
0						
Comments					**************************************	
Instrumentalon:						
eri dittetittiOi);	Quanta	Hydrolab Data	sonde4 H	loriba U22		Other
Calibration: ph Buffers	1/10	Eh Reference	H/nel			
7			CAL PA	SC Refe	erence:	3 umhos
Turbidity Reference	Solution	2NTU's				
Sample ID: <i>1EAD-05</i>	-05-616	-115				
	03-013	Samp	le Collection Time:	1100		
Samples Collected: VOC	s 8260B	Suifide	тос		ations	
ace metals	SVOC's					
ace merals i		Explosives	TPH Gas	D	ioxins	
	Anions/Alkalinity/I	DS	BTEXN TP	H Diesei		
	_			H Diesel		
Perchlorate TSS	Anions/Alkalinity/I Bicarbona		BTEXN TP	H Diesel	Sulfi	tes
Perchlorate	_	ites		H Diesei	Sulfi	tes

		70991.010104	Sample Location	on	TEADN	Suface Wat	er	Groundwater X
		nel: Dennis Adai			13-05	Start Time	1110	Finish Time 1/25
1	DTWE	DTI	-	Product Thick	ness	₹ Me	asuring Point	0
Boreno	ole Dia.	Total	Casing Depth	Purge	Volume /	2 gallons		Chody Iron
Samol	ing Method:	Dedigated St	in a militar D.		WFOOS			
			ibmersible PumpPortable Bladde	- 0			_ PDB	
	Disposable Bai	iler			Surge/Ba	all	Surge Block	Туре
			Pump Stopped		ther			
1			runnp otoppad	Parameters	Total Gai	llon <u>s</u>	Organic Va	opr at Wellhead
Time (milita		SC	D.O.	EH-O	RP Turbidity		Vol Evac.	
1/12				pH (millive			(gal.)	Comments
111-		0230	7.36 7	84 -20	5 2.2			
			-			<u> </u>		
							-	
						-		
	·							
ļ							-	
Final								
Time	pН	SC						
(military		(umhos/cm)	Temp (C) (milli	ORP D.O.	Turbidity		Vol Evac,	
1112	7.84	2250	1911 -2	volts) (mg/L) 25 7/3/		Flow Rate	(gal.)	Comments
Commen	ts							
Instrumer	ntaion:	Quanta	Hydro	lab Datasonde4		Horiba U22		
0-114		7/10				Horiba UZZ		Other
Calibratio	n: ph Buffers	7/10	Eh Refere	ence QH/p	4	SC Re	eference: _/	4/3 umhos
	Turbidity Refer	anca Calutian	_					dillios
	Toronary (Ceres	erice Solution	e'UTM					
Sample ID	18Ah	-05-05-1	11-415	Comple O. "	. 41	111 2		
				Sample Colle	ction Time:	1119		
Samples C	ollected:	VOC's 8260B	S	llfide	тос	1	Cations	
ace metals		SVOC's	- Carrier					
			Explos	ives	TPH Gas		Dioxins	
Perchlorati	e	Anions/Alkali	nity/TDS	BTEXN	т	PH Diesel		
TSS	•							1
	<u>'</u>	Picar	bonates	Nitr	ates/Nitites		s	ulfites
MS/MSD		BD:		TB called:				
				· _		L_		

LINIACTINO:	1970	991.010104	Sample Lo	ocation	TE	EADN	_Suface Wa	for	O
Samplin	ig Personnel	: Dennis Adai	ms/David Imia	y Date:				1/15	Groundwater X
DTW		DTI		Produ	ct Thickness			asuring Point	Finish Time 1/4
Borshole Di	ia. P	Total	Casing Depth		_Purge Vol		gallons		CLOUNG, MO
Sampling N	Vetbod:	Declinated Su	A						
		Dedicated Su			W			PD8	
Disno	osable Bailer			ladder Pump	***	_ Surge/Ba	il	Surge Bloc	k Type
Pump Starte			Grab		Other				
,			_ Pump Stop		meters Tak	Total Gall	ons	_Organic Va	vopr at Wellhead
Time		sc	D.O.	1 111	EH-ORP	Turbidity		Voi Evac.	
(military)	Temp (C)	(umhos/cm)	· • ·		(millivolts)	(NTU)		(gal.)	Comments
1125	18.33	2390	6.73	7.70	-207	112		(300.1)	Comments
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Man we way you a second								-	

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inal	-								
Time	рН	SC		EH-ORP	D.O.	Turbidity		Val 5	
Time (military)		(umhos/cm)	Temp (C) ((millivolts)	(mg/L)	Turbidity (NTU)	Flow Rate	Vol Evac.	
Time (military)			Temp (C) ((millivolts)			Flow Rate	Vol Evac. (gal.)	Comments
Time (military) /25		(umhos/cm)	Temp (C) ((millivolts)	(mg/L)	(NTU)	Flow Rate		Comments
Time military) /2 5		(umhos/cm)	Temp (C) ((millivolts)	(mg/L)	(NTU)	Flow Rate		Comments
Time (military) /25		(umhos/cm)	Temp (C) ((millivolts)	(mg/L)	(NTU)	Flow Rate		Comments
Time (military) /3 5	7.70	(umhos/cm)	Temp (C) ((millivolts)	(mg/L)	(NTU)	Flow Rate		Comments
Time (military) /3 5	7.70	(umhos/cm)	Temp (C) ((millivolts) ~ 407	(mg/L) 6:73	(NTU)	Flow Rate		
Time (military) / 2 5	7.7 <i>0</i>	(umhos/cm) 2390	Temp (C) ((millivolts) - 207 ydrolab Datas	(mg/L) 3	(NTU)	Flow Rate		Comments
Time (military) / 2 5	7.7 <i>0</i>	(umhos/cm) 2390	Temp (C) ((millivolts) - 207 ydrolab Datas	(mg/L) 3	(NTU)	Flow Rate	(gal.)	Other
Time (military) 2 5 pmments strumentaion libration: ph	7.70	(umhos/cm) 2390 Quants	Temp (C) ((millivolts) 207 ydrolab Datas	(mg/L) 3	(NTU)	Flow Rate	(gal.)	
Time (military) 25 pmments etrumentaion libration: ph	7.70 n: n Buffers	Quants 2 Solution	Temp (C) (19.33)	(millivolts) - 207 ydrolab Datas	(mg/L) 3	(NTU)	Flow Rate	(gal.)	Other
Time (military) 25 pmments strumentaion libration: ph	7.70 n: n Buffers	Quants 2 Solution	Temp (C) (19.33)	(millivolts) - 207 ydrolab Datas eference 4	(mg/L) >	(NTU)	flow Rate	(gal.)	Other
Time (military) 2 5 pmments etrumentaion illibration: ph	7.70 n: n Buffers	(umhos/cm) 2390 Quants	Temp (C) (19.33)	(millivolts) - 207 ydrolab Datas eference 4	(mg/L) 3	(NTU)	Flow Rate	(gal.)	Other
Time (military) 2 5 pmments etrumentaion illibration: ph	7.70 n: nBuffers	Quanta Quanta Oce Solution 05-05-1	Temp (C) (19.33)	(millivolts) - 207 ydrolab Datas oference 4	(mg/L) >	(NTU)	Flow Rate	(gal.)	Other
Time (military) 2 5 extrumentaion Ilibration: ph Turbic mple ID: 2	7.70 n: nBuffers	Quanta Quanta Obs Solution C's 8260B	Temp (C) (19.33)	(millivolts) - 207 ydrolab Datas eference 4	(mg/L) >	(NTU)	Flow Rate	(gal.)	Other
Time (military) 2 5 extrumentaion Ilibration: ph Turbic mple ID: 2	7.70 n: nBuffers	Quanta Quanta 05-05-05-0	Eh R	(millivolts) - 207 ydrolab Datas oference 4	onde4	n Time:	Flow Rate	(gal.)	Other
Time (military) 2 5 comments etrumentaion libration: ph Turbic mple ID: 2 mples Collect metals	7.70 n: nBuffers	Quanta Quanta Oe Solution C's 8260B SVOC's	Eh Ro	ydrolab Datas oference 4 TU's Sulfide	onde4	(NTU)	Flow Rate	(gal.)	Other
Time (military) 2 5 comments etrumentaion libration: ph Turbic	7.70 n: nBuffers	Quanta Quanta Obs Solution C's 8260B	Eh Ro	ydrolab Datas oference 4 TU's Sulfide explosives	onde4	n Time:	flow Rate	(gal.)	Other
Time (military) 2 5 comments etrumentaion libration: ph Turbic mple ID: 2 mples Collect metals rchlorate	7.70 n: nBuffers	Quanta Quanta Quanta C's 8260B SVOC's Anions/Alkalin	Eh Ro	ydrolab Datas oference 4 TU's Sulfide explosives	onde4 Collection TF	n Time: TOC PH Gas	Flow Rate	(gal.)	Other
Time (military) 2 5 comments etrumentaion libration: ph Turbic mple ID: 2 mples Collect metals rchiorate TSS	7.70 n: nBuffers	Quanta Quanta Quanta C's 8260B SVOC's Anions/Alkalin	Eh Ro	ydrolab Datas oference 4 TU's Sulfide explosives	onde4	n Time: TOC PH Gas	flow Rate	(gal.) oference: //	Other
Time (military) 2 5 comments etrumentaion libration: ph Turbic mple ID: 2 mples Collect metals rchlorate	7.70 n: nBuffers	Quanta Qu	Eh Ro	ydrolab Datas oference 4 TU's Sulfide explosives	onde4 Collection TF	n Time: TOC PH Gas	flow Rate	(gal.) oference: //	Other

	Dennis Adams/Davi	nple Location	-5-12 -0	ADN	_Surace Wat		Groundwater
DTW	DTP Ø		juct Thickness		Start time	1090	Finish Time 13
Borehole Dia	Total Casing	Depth	Purge Volu		gallons	asuring Point Weather	Ileda, Co
Sampling Method:	Dedicated Submersit	ole Pumo		Cabis			
Dedicated Bladder Pump	Port	ble Bladder Pum	- W			PDB	
Disposable Bailer		Grab		Surge/Bai		Surge Block	k Type
Pump Started		p Stopped	Other_				
	, 4.11,		rameters Take	Total Gallo	on <u>s</u>	_Organic Va	vopr at Wellhead
Time (military) Temp (C)	SC D.	0.	EH-ORP	Turbidity		Val Euro	
(military) Temp (C) 1042 17.28	(umhos/cm) (mg	7.94	(millivolts)	(NTU)	Flow Rate	Vol Evac. (gal.)	Comments
inal Time pH	SC umhos/cm) Temp (0	EH-ORP		Turbidity	\	/ol Evac.	
military) 242 7.94 (1	1450 17.1			(NTU) I	Flow Rate	(gal.)	Comments
<u> 192 7.99</u>	1450 17:23					(gal.)	Comments
<u> 192 7.99</u>			6.73	0.0		(gal.)	
DYZ 7.99 comments	2450 17:23 Quanta	Hydrolab Data	6.73	0.0 H	oriba U22		Other
Domments Strumentaion:	2450 17:23 Quanta	£ -/87	6.73	0.0 H	oriba U22	(gal.)	Other
omments strumentalon: libration: ph Buffers	Quanta	Hydrolab Data Eh Reference	6.73 asonde4	0.0 H	oriba U22	ierence:	Other
ornments trumentalon: libration: ph Buffers Turbidity Reference	Quanta	Hydrolab Data Eh Reference NTU's Samp	6.73	0 · 0 H	oriba U22SC Rei	erence:	Other
trumentalon: ibration: ph Buffers Turbidity Reference pple ID: YEAD . 04	Quanta Quanta Solution 500 500 500 500 500 500 500 5	Hydrolab Data Eh Reference NTU's Samp	Sonde4	Time:	oriba U22SC Ref	erence:	Other
trumentalon: ibration: ph Buffers Turbidity Reference pple ID: YEAD . 04 aples Collected: VOC' metals	Quanta Quanta Solution 500 \$ 8260B	Hydrolab Data Eh Reference NTU's Samp Sulfide Explosives	conded	Time: TOC	SC Ref	erence:	Other
trumentalon: ibration: ph Buffers Turbidity Reference pple ID: YEAD . 04 aples Collected: VOC' metals	Quanta Quanta Solution Solve Solv	Hydrolab Data Eh Reference NTU's Samp Sulfide Explosives	Sonde4	Time: TOC TPH	oriba U22SC Ref	Pations Dioxins	Other

Project No: 19	70001.010104	Sample Loca	ation	TE	ADN	Suface Wa	ter	_Groundwater X
Sampling Person			•	5-12-			1300	Groundwater X Finish Time /324
Borehole Dia.	DTP		Produc	t Thickness			esuring Point	6
	TO(B)	Casing Depth_		Purge Volu	ime	gallons	Weather	[hody, lool
Sampling Method:	Dedicated Suit	omersible Pump	_		7			
Dedicated Bladder Pr	imn			W	Cabis	<u> </u>	PDB	
Disposable Ba		•			Surge/Bai		Surge Bloc	k Type
Pump Started		. Grab Pump Stoppe		Other		****		
-		_ rump stoppe	Para	neters Take	Total Gallo	on <u>s</u>	Organic Va	vopr at Wellhead
Time (military) Temp (f	sc	D.O.		EH-ORP	Turbidity		Vol Evac.	
	(umhos/cm) 2440	(mg/L)	pH	(millivolts)	(NTU)	Flow Rate	(gal.)	Comments
1510 10.7	4770	7.80	F. 22	-188	2.0		13/	Contributed
	-							****
			-					
				-				
				_				
,								
				-	*****			
Final								
Time pH	SC		H-ORP	D.O. 1	Furbidity		Vol Even	
Time pH (military)	(umhos/cm)	Temp (C) (mi	llivoits)	(mg/L)	Furbidity (NTU)	Flow Rate	Vol Evac.	Comments
Time pH (military)	(umhos/cm)	Temp (C) (mi	llivoits)	(mg/L)			Vol Evac. (gal.)	Comments
Time pH (military) 9.22	(umhos/cm)	Temp (C) (mi	llivoits)	(mg/L)	(NTU)			Comments
Time pH (military)	(umhos/cm)	Temp (C) (mi	llivoits)	(mg/L)	(NTU)			Comments
Time pH (military) 9.22	(umhos/cm)	Temp (C) (mi	llivoits)	(mg/L)	(NTU)			Comments
Time pH (military) 9.22 Comments	(umhos/cm) 2440	Temp (C) (ml	llivoits)	(mg/L)	(NTU)			Comments
Time pH (military) 9.22 Comments	(umhos/cm) 2440	Temp (C) (ml	llivoits)	(mg/L)	(NTU) 1			
Time pH (military) 13/0 2.22 Comments Instrumentaion:	(umhos/cm) 2440	Hydr	Illivoits) # \$ 7	(mg/L)	(NTU) I	oriba U22	(gal.)	Other
Time pH (military) 9.22 Comments Instrumentaion:	(umhos/cm) 2440	Hydr	Illivoits) # \$ 7	(mg/L)	(NTU) I	oriba U22	(gal.)	Other
Time pH (military) 9.22 Comments Instrumentaion: Calibration: ph Buffers	(umhos/cm) 2440 / 2 / 4 / 0 / 2 / 4 / 0 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2	Hydr	illivoite) 9 9 7	(mg/L)	(NTU) I	oriba U22		Other
Time pH (military) 9.22 Comments Instrumentaion: Calibration: ph Buffers Turbidity Refere	Quanta 7/10 ence Solution	Hydr Eh Refe	illivoite) 9 9 7	(mg/L)	(NTU) I	oriba U22	(gal.)	Other
Time pH (military) 3 0	Quanta 7/10 ence Solution	Hydr Eh Refe	rolab Datasc	onde4	(NTU) 1	oriba U22SC Re	(gal.)	Other
Time pH (military) 3 0	Quanta 7/10 ence Solution	Hydr Eh Refe	rolab Datasc	(mg/L)	(NTU) 1	oriba U22	(gal.)	Other
Time pH (military) 3 0	Quanta 7/10 ence Solution	Hydr Eh Refe	rolab Datasc	onde4	(NTU) 1	oriba U22 SC Re	(gal.)	Other
Time pH (military) 3 0	Quanta 7/10 ence Solution 05-05- 15/ 000's 82608	Hydr Eh Refe	rolab Datascorence Semple	onde4 Collection	Time:	oriba U22 SC Re	(gal.)	Other
Time pH (military) 3/0 9.22 Comments Instrumentaion: Calibration: ph Buffers Turbidity Refere Sample ID: 1000 - Samples Collected: Vace metals	Quanta	Eh Refe	rolab Datasc	onde4 Collection	(NTU) 1	oriba U22 SC Re	(gal.)	Other
Time pH (military) 3 / 0	Quanta 7/10 ence Solution 05-05- 15/ 000's 82608	Eh Refe	rolab Datascorence Sample Sulfide	onde4 Collection	Time: TOC H Gas	oriba U22 SC Re	(gal.)	Other
Time pH (military) 3/0 9.22 Comments Instrumentaion: Calibration: ph Buffers Turbidity Refere Sample ID: 1640 - Samples Collected: Vace metals Perchlorate	Quanta Quanta Quanta 7/10 ence Solution OS-OS-E/ OC's 82608 SVOC's Anions/Alkalinin	Eh Refe NTU' Explo	rolab Datascorence Sample Sulfide	Collection TP	Time: TOC H Gas	oriba U22 SC Re	(gal.)	Other
Time (military) 3 0 2 2 Comments Instrumentaion: Calibration: ph Buffers Turbidity Reference Sample ID: TAD - Samples Collected: Vace metals Perchlorate TSS	Quanta	Eh Refe NTU' Explo	rolab Datascorence Sample Sulfide	onde4 Collection	Time: TOC H Gas	oriba U22 SC Re	(gal.) oference:	Other
Time (military) 3	Quanta Quanta Quanta 7/10 ence Solution OS-OS-E/ OC's 82608 SVOC's Anions/Alkalinin	Eh Refe NTU' Explo	rolab Datascorrence Sample Suifide Datascorrence Builde	Collection TP	Time: TOC H Gas	oriba U22 SC Re	(gal.) oference:	Other umhos

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LIST OF ACRONYMS

%D percent difference %R percent recovery

CDQMP Chemical Data Quality Management Plan

CVS calibration verification standards

DQO data quality objective

EMAX Laboratories Inc.

GC/MS gas chromatography/mass spectrometry

ICAL initial calibration

ICV initial calibration verification

LCS laboratory control sample LCD laboratory control duplicate

MDL method detection limit

MS/MSD matrix spike/matrix spike duplicate

MWH Americas, Inc

PARCC precision, accuracy, representativeness, comparability, and completeness

QC quality control

RL reporting limit

RPD relative percent difference RRF relative response factor RSD relative standard deviation

SOP standard operating procedure

SPCC system performance check compound

SWMU Solid Waste Management Unit

TCE trichloroethene
TEAD Tooele Army Depot

VOC volatile organic compound

USACE United States Army Corps of Engineers

U.S. EPA United States Environmental Protection Agency

B1.0 DATA VERIFICATION AND VALIDATION

B1.1 INTRODUCTION

B1.1.0.1. This report presents the results of the verification and validation of analytical data for extraction well, influent, and effluent samples collected at Solid Waste Management Unit (SWMU) 2, Tooele Army Depot (TEAD), Utah, as part of groundwater monitoring. Samples were collected on May 9, 11, 12, 17, 18, 19, and 31, 2005. EMAX Laboratories Inc. (EMAX) of Torrance, California provided analytical support for this project. The MWH Americas, Inc (MWH) Project Chemist conducted a Level III verification for all data and conducted a Level IV data verification for 10 percent of the data.

B1.1.0.2. Samples were analyzed for volatile organic compounds (VOCs) by method SW-846/8260B. The analytical results for the May 2005 sampling round are presented by method in Table B-1.

B1.1.0.3. The analytical results were evaluated against the project-specific data quality objectives (DQOs), which are quantitative and qualitative statements that specify data quality and are expressed in terms of precision, accuracy, representativeness, comparability, and completeness (PARCC). This data evaluation is presented in terms of the PARCC criteria and was based on the *Chemical Data Quality Management Plan* (*CDQMP*) Tooele Army Depot, Final Revision 3 (United States Army Corps of Engineers [USACE], 2004) and the TEAD post closure permit.

B1.1.0.4. Data verification is the process of evaluating the quality control (QC) parameters against the criteria established by the analytical methods in the SW-846 and the CDQMP and qualifying those data points where the QC criteria is outside the established criteria. The following QC parameters were evaluated:

- CDQMP compliance
- Sample extraction and analytical holding times

- Method and trip blank sample results
- Reporting limits (RLs)
- Field duplicate sample results
- Tune standard results
- Initial calibration (ICAL), initial calibration verification (ICV), and continuing calibration verification standards (CVS) results
- Surrogate spike recoveries
- Laboratory control sample (LCS) and laboratory control duplicate (LCD) results
- Matrix spike/matrix spike duplicate (MS/MSD) sample results
- Internal standard results.

Sample data that were qualified due to the data verification are listed in Table B-2. Sample batch information is listed in Table B-3.

B1.1.0.5. In addition to the Level III data verification process, a Level IV verification was conducted for 10 percent of the data in accordance with the CDQMP. In addition to the QC parameters reviewed during the Level III verification process, the following data review was conducted as part of the Level IV verification:

- Review of raw data from the instrument (i.e. chromatograms, quantitation reports, spectra)
- Back check of all calculations
- Review of sample preparation and analytical logs

B1.1.0.6. A qualitative assessment was also conducted to evaluate whether the verified data were of sufficient quality to support the project objective (i.e., end use), which is compliance with the quarterly monitoring requirements.

B1.1.07. The validation process was conducted by assessing the following:

- Were all data that were scheduled for this project collected, i.e., were groundwater samples collected from groundwater as it enters and exits the groundwater treatment system, and from every active extraction well?
- Did the sample RLs or method detection limits (MDLs) meet the permit specifications?
- Were data qualified with an "UJ" flag as an estimated RL and did these data impact the decision making process, i.e., would the same decision have been made if the data had not been "UJ" flagged?
- Was the data completeness goal of 90 percent for this project met, i.e., were sufficient data of sufficient quality collected to meet the project completeness goal?

B1.1.0.8. The following sections describe the data verification procedures, discuss data that have significant QC problems (i.e., rejected data), and describe any analytical method or CDQMP deviations.

B2.0 DATA VERIFICATION/VALIDATION RESULTS

B2.1 COMPLETENESS EVALUATION

B2.1.1 Sampling Completeness

B2.1.1.1 All samples and QC samples were collected as scheduled resulting in 100 percent completeness for this project.

B2.1.2 Analytical Completeness

B2.1.2.1. Analytical completeness was evaluated on a per analyte basis using the following equation:

$$Completeness = \frac{Number of valid data points}{Total number of measurements} \times 100$$

Where: The number of valid data points is the total number of valid analytical measurements based on the precision, accuracy, and holding time evaluation.

Based on the results of the data verification described in the following sections, all data are considered valid as qualified. Analytical completeness was 100 percent, which met the analytical completeness goal of 90 percent for all analytes.

B2.1.3 Data Validation in Relation to Completeness

B2.1.3.1. The results of the data validation in relation to completeness indicate that all samples were collected as scheduled and analyzed in accordance with the CDQMP.

B2.2 REPRESENTATIVENESS EVALUATION

B2.2.0.1. Representativeness is a qualitative expression of the degree to which sample data accurately and precisely represent a characteristic of a population, a sampling point,

or an environmental condition. Representativeness is maximized by ensuring that, for a given project, the number and location of sampling points and the sample collection and analysis techniques are appropriate for the specific investigation, and that the sampling and analysis program provides information that reflects "true" site conditions. Laboratory data were evaluated for representativeness by assessing compliance with the following:

- CDQMP Tooele Army Depot, Final Revision 3 (USACE, 2004)
- Sample preservation and holding time criteria
- Method and trip blank criteria
- Field duplicate sample results
- Reporting limit criteria

B2.2.1 CDQMP Compliance Evaluation

B2.2.1.1. Based on the data verification, all samples were analyzed following the quality control criteria specified in the CDOMP.

B2.2.2 Sample Preservation Evaluation

B2.2.2.1. Temperature blanks were included with each sample cooler for measurement upon receipt at the laboratory to assess whether the samples met temperature requirements. The temperature criterion was met for all samples.

B2.2.3 Holding Time Evaluation

B2.2.3.1. Holding time reflects the length of time after sample collection that a sample or extract remains representative of environmental conditions. For VOCs, the length of time between sample collection and analysis was evaluated. Holding times were compared to standard method-specific holding times accepted by the United States Environmental Protection Agency (U.S. EPA). Data for samples that were extracted and analyzed within

holding time criteria are considered representative. Holding times are presented in Table B-4. All sample holding times were met for this sampling round.

B2.2.4 Sample Blanks Evaluation

- **B2.2.4.1** If target analytes were detected in a blank and an associated investigative sample, the sample data were evaluated and qualified using the following criteria:
 - Non-Common Laboratory Contaminants. If a target analyte was detected in a blank and in an associated sample, and the concentration of the analyte in the environmental sample was less than five times the concentration detected in the blank, the detection of the analyte in the sample was considered a false positive. The sample datum was qualified with a "UB" flag to indicate that the datum is considered not detected at the concentration reported based on blank data. If the concentration of a target analyte in the environmental sample was greater than five times the concentration detected in an associated blank, the sample datum was with a "B" flag to indicate the analyte was detected in an associated blank.
 - Common Laboratory Contaminants. If a target analyte was detected in a blank and in an associated sample, and the concentration of the analyte in the environmental sample was less than ten times the concentration detected in the blank, the detection of the analyte in the sample was considered a false positive. The sample datum was qualified with a "UB" flag to indicate the datum is considered not detected at the reported concentration based on blank data. If the concentration of a target analyte in the environmental sample was greater than ten times the concentration detected in an associated blank, the sample datum was qualified with a "B" flag to indicate the analyte was detected in an associated blank.
- **B2.2.4.2. Method Blanks.** The method blank contains all the reagents used in the processing of samples and is carried through the complete analytical procedure used for

the samples. Method blank sample data are presented in Table B-5. No analytes were detected in the method blank samples.

B2.2.4.3. Trip Blank Evaluation. A trip blank accompanied each sample cooler and was analyzed to verify that the samples were not contaminated by the sample containers or other samples during transport to and/or at the laboratory. The trip blank accompanied the empty bottle sets to the site and consisted of a set of VOC sample bottles that had been filled by the laboratory with organic-free water. The trip blanks remained unopened and with the samples during sample collection and shipping. The trip blank data are presented in Table B-6. No analytes were detected in the trip blank samples.

B2.2.5 Reporting Limit Evaluation

B2.2.5.1. The RL is the lowest concentration that can be reliably achieved within limits of precision and accuracy during routine instrument operating conditions and is based on the MDL for each analyte.

B2.2.5.2. The RLs reported by the laboratory were compared to the criteria specified in the TEAD Post Closure Permit. All sample RLs were in less than or equal to those listed in the TEAD Post Closure Permit. If a target compound was detected between the MDL and RL, the result was qualified with a "J" flag to indicate the data are estimated and reflect a value between the MDL and RL.

B2.2.6 Field Duplicate Evaluation

B2.2.6.1. Field duplicate samples were collected and analyzed to evaluate sampling and analytical representativeness and precision. Because precision is affected by several variables including sample heterogeneity, collection procedures, preparation, and analysis, the results of field duplicates were used as additional evidence to support data quality rather than as a basis for accepting or rejecting data.

B2.2.6.2. The relative percent difference (RPD) was calculated only for those analytes that were detected above the reporting limit in both the environmental and field duplicate

samples. The field duplicate data are presented in Table B-7. A review of the sample results and the RPDs indicate good agreement between the sample and its respective duplicate.

B2.2.7 Data Validation Results in Relation to Representativeness

B2.2.7.1. The results of the data validation in relation to representativeness indicate that the data are of sufficient quality to support end use. All samples were collected as scheduled and analyzed in accordance with the CDQMP.

B2.3 ACCURACY EVALUATION

B2.3.0.1. Accuracy is a measure of the bias of a method or the level of agreement between a measurement and a known true value. Accuracy is evaluated by percent recovery (%R), which is calculated using the following equation:

$$\%R = \frac{A - B}{C} \times 100$$

Where: A = the measured concentration of the spiked analyte in a spiked sample

B = the measured concentration of the spiked analyte in an unspiked sample

C = the concentration of the analyte used for spiking.

Laboratory accuracy was evaluated using the instrument calibration and internal standard results and surrogate, MS/MSD, LCS and LCD spiking compound recoveries.

B2.3.1 Tune Standard Evaluation

B2.3.1.1 For gas chromatography/mass spectroscopy (GC/MS) methods the analytical instruments must be tuned to demonstrate that the instrument is functioning such that it will detect the compounds of interest during analysis. Sample analysis can not proceed

unless the tune standard criteria are met; otherwise sample data are flagged with an "R" and are not usable. All tune standards for VOC analysis were within acceptance criteria.

B2.3.2 Initial Calibration, Initial Calibration Verification, and Continuing Calibration Verification Standards Evaluation

- **B2.3.2.1.** ICAL, ICV, and CVS were analyzed prior to and during sample analysis as specified by the analytical method. The ICAL is used to demonstrate linearity of instrument calibration, the ICV is used to verify the ICAL by using a second source standard, and the CVS is used to assess whether the ICAL remains valid. The ICAL, ICV, and CVS results were evaluated against the QC criteria specified in the CDQMP. If either the ICAL, ICV, or CVS QC criteria were not met the data for all samples associated with the ICAL, ICV, or CVS were qualified as follows:
 - ICAL Relative Standard Deviation Outside Acceptance Criteria. If the relative standard deviation (RSD) or correlation coefficient (r²) was outside acceptance criterion, the calibration curve was evaluated to determine which standard caused the non-conformance. If the lowest level of the calibration curve was not the cause of the non-conformance, and the laboratory demonstrated that the RL was met, no non-detect data were qualified. For detected compounds where the RSD or r² exceeded the acceptance criteria, the data were considered estimated with an unknown bias and were qualified with a "J" flag.
 - ICAL Average Relative Response Factor (RRF) Outside Acceptance Criteria (GC/MS Analysis Only). If the RRF was outside acceptance criteria for system performance check compounds (SPCCs) (refer to the CDQMP for method specific criteria or the acceptance criteria of > 0.05 for non-SPCC compounds), the sample data were qualified as follows. If the analytes were not detected in the associated samples, the sample results were "R" qualified to indicate the data are not usable. If the corresponding analytes were detected in the associated samples, the sample results were qualified with a "J" flag to indicate the data were estimated.

- the ICV %D (if RSD was used) or the %Drift (if r² was used) was outside acceptance criteria the bias was determined. If the bias was high, non-detected analytes associated with the ICV, were not qualified; detected analytes associated with the ICV were qualified with a "J" flag indicating the datum was estimated, potentially biased high. If the bias was determined to be low non-detected analytes associated with the ICV were qualified with a "UJ" flag, indicating a possible false negative, and the RL is estimated; detected analytes associated with the ICV were qualified with a "UJ" flag indicating the data are estimated, potentially biased low.
- CVS Percent Difference (%D) or Percent Drift Outside Acceptance Criteria. If the CVS %D (if RSD was used) or the %Drift (if r² was used) was outside acceptance criteria the bias was determined. If the bias was high, non-detected analytes associated with the CVS, were not qualified; detected analytes associated with the CVS were qualified with a "J" flag indicating the datum was estimated, potentially biased high. If the bias was determined to be low, non-detected analytes associated with the CVS were qualified with a "UJ" flag, indicating a possible false negative, and the RL is estimated; detected analytes associated with the CVS were qualified with a "J" flag indicating the data are estimated, potentially biased low.
- The CVS Average RRF was Below Acceptance Criteria. If the CVS average RRF was outside the acceptance criterion of <0.05, the sample data were qualified as follows. Compounds below the acceptance criteria indicate a potential bias during sample analysis. If the analytes were not detected in the associated samples, the sample results were "R" qualified to indicate the data are not usable. If the corresponding analytes were detected in the associated samples, the sample results were qualified with a "J" flag to indicate the data were estimated.

- **B2.3.2.2.** No sample data were qualified due to ICAL or ICV results. All CVS RRFs and percent drift were within acceptance criteria. Sample data qualified due to the CVS %D are listed in Table B-2 with "CVS" as the QC type.
- **B2.3.2.3.** One 1,1,2,2-tetrachloroethane sample result was qualified with a "UJ" flag because the associated CVS result was below the acceptance criterion. Although this datum was qualified as potential false negatives, there is no affect on the decision making process or data usability because the datum is consistent with the historical data.

B2.3.3 Surrogate Spike Evaluation

- **B2.3.3.1.** Surrogate spike recoveries were used to evaluate the accuracy of the analytical data and to monitor laboratory control procedures for organic analyses. Samples were spiked with surrogates according to the laboratory's standard operating procedures (SOPs). The surrogate spike recovery data were evaluated using the acceptance criteria outlined in the CDQMP. Surrogate recoveries are presented with the sample data in Table B-1. The following criteria were used to evaluate surrogate recoveries:
 - below the acceptance criteria indicate a potential low bias during sample analysis. Therefore, if the surrogate recovery was below the acceptance criteria and the surrogate recovery was greater than or equal to ten percent, non-detect compounds associated with the surrogate were qualified with a "UJ" flag indicating a possible false negative and the RL is estimated. If the surrogate recovery was less than 10 percent, then the associated compounds were qualified with an "R" flag indicating the data may not be usable. If analytes associated with the surrogates were detected in the sample, the sample results were qualified with a "J" flag to indicate the data are estimated and are potentially biased low.
 - Surrogate Recoveries Above Acceptance Criteria. Surrogate recoveries above the acceptance criteria indicate a potential high bias during sample analysis. Therefore, if the surrogate recovery was above the acceptance

criteria, non-detected compounds associated with the surrogate were not qualified because of the potentially high bias. If the compounds associated with the surrogate were detected in the sample, the sample results were qualified with a "J" flag to indicate the data are estimated and potentially biased high.

B2.3.3.1. All surrogate recoveries were within the acceptance criteria specified in the CDQMP.

B2.3.4 Matrix Spike/Matrix Spike Duplicate Sample Evaluation

B2.3.4.1. Site specific MS and MSD samples were analyzed to assess accuracy and to identify possible adverse matrix effects. These samples were spiked with target analytes according to the CDQMP prior to extraction or analysis. The percent recoveries of the spiked compounds were compared to the CDQMP criteria. MS/MSD data are presented in Table B-8. The criteria used to evaluate the MS/MSD samples are described below.

B2.3.4.2. Matrix spike compounds below the acceptance criteria indicate a potential low bias during sample analysis. The following criteria were used for data verification:

- MS/MSD Recovery Below Acceptance Criteria. Matrix spike compounds below the acceptance criteria indicate a potential low bias during sample analysis. Therefore, if corresponding analytes were not detected in the parent sample, the data were qualified with a "UJ" flag, indicating a possible false negative, and the RL is estimated. If corresponding analytes were detected in the parent sample the data were qualified with a "J" flag indicating the data are estimated and are potentially biased low.
- MS/MSD Recovery Above Acceptance Criteria. MS/MSD recoveries above the acceptance criteria indicate a potential high bias during sample analysis. Therefore, if corresponding analytes were not detected in the parent sample, data were not qualified because the recovery indicates a high bias and does not affect non-detect analytes. If corresponding analytes were detected in

the parent sample data were qualified with a "J" flag indicating the data are estimated and are potentially biased high.

- High Analyte Concentration in Parent Sample. If the concentration in the
 parent sample was more than four times the MS/MSD spike concentration and
 the MS/MSD recoveries were outside the acceptance criteria, no data were
 qualified.
- High and Low MS/MSD Recovery Exceedences. Bias cannot be determined if a spike recovery is above the acceptance criterion in the MS and below the acceptance criterion in the MSD, or vice versa. Therefore, the following procedures were used to validate parent sample data. If the parent sample was non-detect for the analytes that were outside the acceptance criteria in the MS/MSD, the parent sample data were not qualified. If the analytes that were outside acceptance criteria in the MS/MSD were detected in the parent sample, the parent sample data were qualified with a "J" flag to indicate that the data are estimated.

B2.3.4.3. All MS/MSD results were with the acceptance criteria specified in the CDQMP.

B2.3.5 Laboratory Control Sample/Laboratory Control Sample Duplicate Evaluation

B2.3.5.1. Laboratory control samples and LCDs were analyzed to assess accuracy in the absence of matrix effects. Deionized water was spiked with target analytes according to the CDQMP prior to analysis. The spiked compounds percent recoveries were compared to the QC limits established in the CDQMP. The same criteria used to evaluate the MS/MSD samples were used to evaluate the LCS and LCD samples, except that all sample data associated with the LCS and LCD were qualified instead of just the parent sample for both organic and metals analyses. LCS and LCD data are presented by analytical method in Table B-9. Sample data that were qualified due to LCS data are

listed in Table B-2 with "LCS" as the QC type. All LCD recoveries were within the acceptance criteria specified in the CDQMP.

B2.3.5.2. One trichloroethene (TCE) sample result was qualified with a "J" flag because

the spike recovery was above the acceptance criterion. Although the datum has been

qualified as estimated with a potential high bias, the datum is consistent with the

historical data

B2.3.5.3. Three 1,1-dichloroethene sample results were qualified with a "UJ" flag

indicating a possible false negative. Although the data have been qualified as estimated

with a potential low bias, the data are consistent with the historical data.

B2.3.5.4. Three Benzene sample results were qualified with a "UJ" flag indicating a

possible false negative. Although the data have been qualified as estimated with a

potential low bias, the data are consistent with the historical data.

B2.3.6 Internal Standard Evaluation

B2.3.6.1 Internal standards are used to access accuracy and to determine the

concentration of target analytes in samples for VOC analyses. Internal standards are

spiked in the sample after sample preparation/extraction, but prior to analysis. Analyte

concentration is determined using the following equation:

$$C_{S} = \frac{A_{S} \times C_{IS}}{A_{IS} \times RF}$$

Where:

 C_S = Concentration of the analyte or surrogate

 A_S = Peak area (or height) of the analyte or surrogate

 C_{IS} = Concentration of the IS

 A_{IS} = Area of the IS

RF = Average response factor of calibration curve

- **B2.3.6.2.** Accuracy was assessed by comparing the IS recovery to the control limits established by the method. The following criteria were used to evaluate IS data:
 - Internal Standard Recovery Below Acceptance Criteria. If the IS recovery was below 50 percent, non-detected analyte associated with the IS were qualified with a "UJ" flag indicating a possible false negative and the RL is estimated. Detected analytes were qualified with a "J" flag indicating the data were estimated.
 - Internal Standard Recovery Above Acceptance Criteria. If the IS recovery is above 200 percent, non-detect compounds were not qualified. Detected compounds were qualified with a "J" flag indicating the data were estimated.
- **B2.3.6.3.** All IS recoveries were within acceptance criteria.

B2.3.7 Data Validation Results in Relation to Accuracy

B2.3.7.1. The results of the data validation in relation to accuracy indicate that the data are of sufficient quality to support end use.

B2.4 PRECISION EVALUATION

- **B2.4.0.1.** Precision measures the reproducibility of measurements under a given set of conditions. Laboratory precision was evaluated using the RPD calculated between the MS and MSD samples and between parent and field duplicate samples.
- **B2.4.0.2. Relative Percent Difference Evaluation.** RPD is calculated using the following equation:

$$RPD = \left(\frac{|A - B|}{[A + B]/2}\right) \times 100$$

Where: A and B are the reported concentrations for sample duplicate analyses.

B2.4.1 Matrix Spike/Matrix Spike Duplicate Sample Evaluation

B2.4.1.1. The following criteria were used for the MS/MSD precision evaluation. If the RPD exceeded the acceptance criteria, corresponding analytes detected in the parent sample were qualified with a "J" flag indicating the data are estimated. Because bias cannot be determined when target analytes are not detected in a sample, parent sample data for non-detected analytes were not qualified. The MS/MSD RPD data are presented Table B-8. No sample data were qualified due to MS/MSD RPD results.

B2.4.2 Field Duplicate Sample Evaluation

B2.4.2.1. As discussed previously, sample data were not qualified based on field duplicate sample results. These data were used qualitatively as additional evidence to support data comparability and quality. The RPDs for the field duplicate samples are presented in Table B-7. A comparison of the sample results and the RPDs indicate good agreement between the parent sample and its respective duplicate.

B2.4.3 Data Validation Results in Relation to Precision

B2.4.3.1. The results of the data validation in relation to precision indicate that the data are of sufficient quality to support end use. All samples were analyzed in accordance with SW-846, the CDQMP, and no data were qualified as a result of out of compliance precision.

B2.5 COMPARABILITY EVALUATION

B2.5.0.1. Comparability is a qualitative parameter that expresses the confidence that one data set may be compared to another. For this project, sample collection and analysis followed standard methods and the data were reported using standard units of measure. In addition, data from this sampling round were compared to previous sampling rounds and the data from this sampling round were found comparable to previous sampling rounds.

B3.0 DATA VERIFICATION/VALIDATION SUMMARY

B3.0.0.1. Precision. Based on the results of the MS/MSD and field duplicate sample analyses, the data are precise as reported.

B3.0.0.2. Accuracy. Based on the tune standard, ICAL, ICV, CVS, internal standard, surrogate, MS/MSD, LCS, and LCD results, the data are accurate as qualified.

B3.0.0.3. Representativeness. Based on the results of the holding time evaluation, method and trip blank sample analysis, the field duplicate sample evaluation, and the RL evaluation the data are considered representative as reported.

B3.0.0.4. Comparability. Based on the results of the comparability evaluation, the results from this sampling round are comparable. Standard methods of sample collection and standard units of measure were used during this project. The analysis performed by the laboratory was in accordance with current SW-846 and EPA methodology and the CDQMP. In addition, comparison of data from this sampling round to previously collected data indicate the data are comparable.

B3.0.0.5. Completeness. Based on the results of the data verification and validation, all data are considered usable. Both sampling and analytical completeness were 100 percent.

B3.0.0.6. Based on the results of the data validation, the data collected for this sampling round were of sufficient quantity and quality to meet the project objectives.

REFERENCES

United States Army Corps of Engineers, 2004. *Chemical Data Quality Management Plan (CDQMP)* Tooele Army Depot, Final Revision 3.

United States Environmental Protection Agency, 1986. *Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (SW-846) (Third Edition, Final Update III, December 1996).

VOLATILE ORGANIC COMPOUNDS SAMPLE DATA SUMMARY MAY 2005

SWMU 2-TOOELE ARMY DEPOT, UTAH

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Location Identification Field Sample Identification Analyte/Methods (Units) Date Collected	E-01 TEAD-05-05-E1-WF 5/12/2005	E-02-1 TEAD-11-05-05-E2.1-WF 5/11/2005
Volatile Organic Compounds/SW8260B (µg/l)		
1,1,1-Trichloroethane	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0
1,1-Dichloroethane	0.53 T	<1.0
1,1-Dichloroethene	<1.0	<1.0 UJ
1,2-Dichlorobenzene	<1.0	<1.0
1,2-Dichloroethane	<1.0	<1.0
1,2-Dichloropropane	<1.0	<1.0
1,3-Dichlorobenzene	<1.0	<1.0
1,4-Dichlorobenzene	<1.0	<1.0
Benzene	<1.0	<1.0 UJ
Bromodichloromethane	<1.0	<1.0
Bromoform	<1.0	<1.0
Bromomethane	<1.0	<1.0
Carbon tetrachloride	0.96 T	<1.0
Chlorobenzene	<1.0	<1.0
Chloroethane	<1.0	<1.0
Chloroform	<1.0	<1.0
Chloromethane	<2.0	<2.0
cis-1,3-Dichloropropene	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0
Dichlorodifluoromethane	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Methylene chloride	< 5.0	< 5.0
Tetrachloroethene (PCE)	<1.0	<1.0
Toluene	<1.0	<1.0
Total 1,2-Dichloroethene	<1.0	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0
Trichloroethene (TCE)	21	13
Trichlorofluoromethane	<1.0	<1.0
Vinyl chloride	<2.0	<2.0
Xylenes, Total	<1.0	<1.0
Surrogate (%) <u>Limit</u>		
1,2-Dichloroethane-d4 70 - 130	107	94
1-Bromo-4-fluorobenzene 70 - 130	100	78
Toluene-D8 70 - 130	99	87

/1	11.	
μg/l	micrograms per liter	

Data are estimated due to associated quality control data.

T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.

UJ Potential low bias, possible false negative.

VOLATILE ORGANIC COMPOUNDS SAMPLE DATA SUMMARY MAY 2005

SWMU 2-TOOELE ARMY DEPOT, UTAH

(Page 2 of 6)

Location Identific Field Sample Identific Analyte/Methods (Units) Date Colle	ation TEAD-11-05-05-E2-2-WF	E-02-2 Dup TEAD-11-05-05-S-E2-2-WF 5/11/2005
Volatile Organic Compounds/SW8260B	(μg/l)	
1,1,1-Trichloroethane	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0
1,1-Dichloroethane	0.22 T	<1.0
1,1-Dichloroethene	<1.0 UJ	<1.0 UJ
1,2-Dichlorobenzene	<1.0	<1.0
1,2-Dichloroethane	<1.0	<1.0
1,2-Dichloropropane	<1.0	<1.0
1,3-Dichlorobenzene	<1.0	<1.0
1,4-Dichlorobenzene	<1.0	<1.0
Benzene	<1.0 UJ	<1.0 UJ
Bromodichloromethane	<1.0	<1.0
Bromoform	<1.0	<1.0
Bromomethane	<1.0	<1.0
Carbon tetrachloride	0.58 T	0.49 T
Chlorobenzene	<1.0	<1.0
Chloroethane	<1.0	<1.0
Chloroform	<1.0	<1.0
Chloromethane	<2.0	<2.0
cis-1,3-Dichloropropene	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0
Dichlorodifluoromethane	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Methylene chloride	< 5.0	< 5.0
Tetrachloroethene (PCE)	<1.0	<1.0
Toluene	<1.0	<1.0
Total 1,2-Dichloroethene	<1.0	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0
Trichloroethene (TCE)	18	17
Trichlorofluoromethane	<1.0	<1.0
Vinyl chloride	<2.0	<2.0
Xylenes, Total	<1.0	<1.0
Surrogate (%) <u>Limit</u>		
1,2-Dichloroethane-d4 70 - 130	0 107	95
1-Bromo-4-fluorobenzene 70 - 130	92	78
Toluene-D8 70 - 130	108	93

/1			4.1
μg/l	micrograms	per	liter.

Data are estimated due to associated quality control data.

T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.

UJ Potential low bias, possible false negative.

VOLATILE ORGANIC COMPOUNDS SAMPLE DATA SUMMARY MAY 2005

SWMU 2-TOOELE ARMY DEPOT, UTAH

(Page 3 of 6)

Location Identification Field Sample Identification Analyte/Methods (Units) Date Collected		E-11 TEAD-05-05-E11-WF 5/12/2005	E-12 TEAD-11-05-05-E12-WF 5/11/2005
Volatile Organic Compounds/SW8	3260B (μg/l)		
1,1,1-Trichloroethane	• • •	<1.0	<1.0
1,1,2,2-Tetrachloroethane		<1.0	<1.0
1,1,2-Trichloroethane		<1.0	<1.0
1,1-Dichloroethane		<1.0	<1.0
1,1-Dichloroethene		<1.0	<1.0
1,2-Dichlorobenzene		<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0
1,3-Dichlorobenzene		<1.0	<1.0
1,4-Dichlorobenzene		<1.0	<1.0
Benzene		<1.0	<1.0
Bromodichloromethane		<1.0	<1.0
Bromoform		<1.0	<1.0
Bromomethane		<1.0	<1.0
Carbon tetrachloride		<1.0	<1.0
Chlorobenzene		<1.0	<1.0
Chloroethane		<1.0	<1.0
Chloroform		<1.0	<1.0
Chloromethane		<2.0	<2.0
cis-1,3-Dichloropropene		<1.0	<1.0
Dibromochloromethane		<1.0	<1.0
Dichlorodifluoromethane		<1.0	<1.0
Ethylbenzene		<1.0	<1.0
Methylene chloride		< 5.0	< 5.0
Tetrachloroethene (PCE)		<1.0	<1.0
Toluene		<1.0	<1.0
Total 1,2-Dichloroethene		<1.0	<1.0
trans-1,3-Dichloropropene		<1.0	<1.0
Trichloroethene (TCE)		8.0	<1.0
Trichlorofluoromethane		<1.0	<1.0
Vinyl chloride		<2.0	<2.0
Xylenes, Total		<1.0	<1.0
Surrogate (%)	<u>imit</u>		
	- 130	109	114
	- 130	99	100
	- 130	98	97

/1			4.1
μg/l	micrograms	per	liter.

Data are estimated due to associated quality control data.

T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.

UJ Potential low bias, possible false negative.

VOLATILE ORGANIC COMPOUNDS SAMPLE DATA SUMMARY MAY 2005

SWMU 2-TOOELE ARMY DEPOT, UTAH (Page 4 of 6)

Location Identification Field Sample Identification Analyte/Methods (Units) Date Collected	E-13 TEAD-05-05-E13-WF 5/12/2005	E-14 TEAD-05-05-E14-WF 5/12/2005
Volatile Organic Compounds/SW8260B (µg/l)		
1,1,1-Trichloroethane	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0
1,1-Dichloroethene	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0
1,2-Dichloroethane	<1.0	<1.0
1,2-Dichloropropane	<1.0	<1.0
1,3-Dichlorobenzene	<1.0	<1.0
1,4-Dichlorobenzene	<1.0	<1.0
Benzene	<1.0	<1.0
Bromodichloromethane	<1.0	<1.0
Bromoform	<1.0	<1.0
Bromomethane	<1.0	<1.0
Carbon tetrachloride	<1.0	<1.0
Chlorobenzene	<1.0	<1.0
Chloroethane	<1.0	<1.0
Chloroform	<1.0	<1.0
Chloromethane	< 2.0	<2.0
cis-1,3-Dichloropropene	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0
Dichlorodifluoromethane	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Methylene chloride	< 5.0	< 5.0
Tetrachloroethene (PCE)	<1.0	<1.0
Toluene	<1.0	<1.0
Total 1,2-Dichloroethene	<1.0	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0
Trichloroethene (TCE)	3.1	18
Trichlorofluoromethane	<1.0	<1.0
Vinyl chloride	<2.0	<2.0
Xylenes, Total	<1.0	<1.0
Surrogate (%) <u>Limit</u>		
1,2-Dichloroethane-d4 70 - 130	108	104
1-Bromo-4-fluorobenzene 70 - 130	104	106
Toluene-D8 70 - 130	99	102

/1	•		11.
ug/l	micrograms	ner	liter

Data are estimated due to associated quality control data.

T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.

UJ Potential low bias, possible false negative.

VOLATILE ORGANIC COMPOUNDS SAMPLE DATA SUMMARY MAY 2005

SWMU 2-TOOELE ARMY DEPOT, UTAH

(Page 5 of 6)

Location Identification Field Sample Identification Analyte/Methods (Units) Date Collected	E-15 TEAD-05-05-E15-WF 5/12/2005	EFF TEAD-05-05-EFF-WF 5/12/2005
Volatile Organic Compounds/SW8260B (µg/l)		
1,1,1-Trichloroethane	<1.0	<1.0
1,1,2,2-Tetrachloroethane	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0
1,1-Dichloroethene	<1.0	<1.0
1,2-Dichlorobenzene	<1.0	<1.0
1,2-Dichloroethane	<1.0	<1.0
1,2-Dichloropropane	<1.0	<1.0
1,3-Dichlorobenzene	<1.0	<1.0
1,4-Dichlorobenzene	<1.0	<1.0
Benzene	<1.0	<1.0
Bromodichloromethane	<1.0	<1.0
Bromoform	<1.0	<1.0
Bromomethane	<1.0	<1.0
Carbon tetrachloride	<1.0	<1.0
Chlorobenzene	<1.0	<1.0
Chloroethane	<1.0	<1.0
Chloroform	<1.0	<1.0
Chloromethane	<2.0	<2.0
cis-1,3-Dichloropropene	<1.0	<1.0
Dibromochloromethane	<1.0	<1.0
Dichlorodifluoromethane	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Methylene chloride	< 5.0	< 5.0
Tetrachloroethene (PCE)	<1.0	<1.0
Toluene	<1.0	<1.0
Total 1,2-Dichloroethene	<1.0	<1.0
trans-1,3-Dichloropropene	<1.0	<1.0
Trichloroethene (TCE)	1.6	<1.0
Trichlorofluoromethane	<1.0	<1.0
Vinyl chloride	<2.0	<2.0
Xylenes, Total	<1.0	<1.0
Surrogate (%) Limit		
1,2-Dichloroethane-d4 70 - 130	111	109
1-Bromo-4-fluorobenzene 70 - 130	104	106
Toluene-D8 70 - 130	102	101

/1			4.1
μg/l	micrograms	ner	liter.

Data are estimated due to associated quality control data.

T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.

UJ Potential low bias, possible false negative.

VOLATILE ORGANIC COMPOUNDS SAMPLE DATA SUMMARY MAY 2005

SWMU 2-TOOELE ARMY DEPOT, UTAH (Page 6 of 6)

	on Identification ble Identification Date Collected	INF TEAD-05-05-INF-WF 5/12/2005
olatile Organic Compounds	s/SW8260B (µg/l)	
1,1,1-Trichloroethane		<1.0
1,1,2,2-Tetrachloroethane		<1.0 UJ
1,1,2-Trichloroethane		<1.0
1,1-Dichloroethane		<1.0
1,1-Dichloroethene		<1.0
1,2-Dichlorobenzene		<1.0
1,2-Dichloroethane		<1.0
1,2-Dichloropropane		<1.0
1,3-Dichlorobenzene		<1.0
1,4-Dichlorobenzene		<1.0
Benzene		<1.0
Bromodichloromethane		<1.0
Bromoform		<1.0
Bromomethane		<1.0
Carbon tetrachloride		<1.0
Chlorobenzene		<1.0
Chloroethane		<1.0
Chloroform		<1.0
Chloromethane		< 2.0
cis-1,3-Dichloropropene		<1.0
Dibromochloromethane		<1.0
Dichlorodifluoromethane		<1.0
Ethylbenzene		<1.0
Methylene chloride		< 5.0
Tetrachloroethene (PCE)		<1.0
Toluene		<1.0
Total 1,2-Dichloroethene		<1.0
trans-1,3-Dichloropropene		<1.0
Trichloroethene (TCE)		6.2 J
Trichlorofluoromethane		<1.0
Vinyl chloride		< 2.0
Xylenes, Total		<1.0
Surrogate (%)	<u>Limit</u>	
1,2-Dichloroethane-d4	70 - 130	89
1-Bromo-4-fluorobenzene	70 - 130	89
Toluene-D8	70 - 130	98

μg/l	micrograms per liter.
Bold	Bolded result indicates positively identified compound.
J	Data are estimated due to associated quality control data.
T	Analyte was positively identified but the reported concentration is estimat
	concentration is less than the reporting limit, but greater than the method (
UJ	Potential low bias, possible false negative.

TABLE B-2

SUMMARY OF QUALIFED DATA MAY 2005

SWMU2-TOOELE ARMY DEPOT, UTAH

(Page 1 of 1)

Field Sample	Sample	Analysis		Sample		QC	QC	QC		Added	
Identification	Date	Method	Analyte	Result	Units	Type	Result	Limit	Bias	Flag	Comment
TEAD-05-05-INF-WF	05/12/05	SW8260B	1,1,2,2-Tetrachloroethane	<1.0	μg/l	CVS	29.9%	±25%	Low	UJ	Reporting limit is estimated. CVS %D
											below acceptance criterion, indicating a potential low bias.
TEAD-05-05-INF-WF	05/12/05	SW8260B	Trichloroethene (TCE)	6.2	μg/l	LCS	123%	80-120%	High	J	Datum is estimated, potentially biased high. LCS recovery above acceptance criterion.
TEAD-11-05-05-E2.1-WF	05/11/05	SW8260B	1,1-Dichloroethene	<1.0	μg/l	LCS	79%	80-120%	Low	UJ	Reporting limit is estimated. LCS recovery below acceptance criterion, indicating a potential low bias.
TEAD-11-05-05-E2.1-WF	05/11/05	SW8260B	Benzene	<1.0	μg/l	LCS	78%	80-120%	Low	UJ	Reporting limit is estimated. LCS recovery below acceptance criterion, indicating a potential low bias.
TEAD-11-05-05-E2-2-WF	05/11/05	SW8260B	1,1-Dichloroethene	<1.0	μg/l	LCS	79%	80-120%	Low	UJ	Reporting limit is estimated. LCS recovery below acceptance criterion, indicating a potential low bias.
TEAD-11-05-05-E2-2-WF	05/11/05	SW8260B	Benzene	<1.0	μg/l	LCS	78%	80-120%	Low	UJ	Reporting limit is estimated. LCS recovery below acceptance criterion, indicating a potential low bias.
TEAD-11-05-05-S-E2-2-WF	05/11/05	SW8260B	1,1-Dichloroethene	<1.0	μg/l	LCS	79%	80-120%	Low	UJ	Reporting limit is estimated. LCS recovery below acceptance criterion, indicating a potential low bias.
TEAD-11-05-05-S-E2-2-WF	05/11/05	SW8260B	Benzene	<1.0	μg/l	LCS	78%	80-120%	Low	UJ	Reporting limit is estimated. LCS recovery below acceptance criterion, indicating a potential low bias.

T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.

D Sample dilution required for analysis; reported values reflect the dilution.

CVS Calibration verification standard

LCS Laboratory control sample

LCD Laboratory control sample duplicate

SURR Surrogate

[%]D Percent difference

TABLE B-3

SAMPLE PREPARATION BATCH SUMMARY
MAY 2005
SWMU 2-TOOELE ARMY DEPOT, UTAH
(Page 1 of 2)

Location	Field Sample	Sample	Sample	Laboratory	Preparation	Preparation	Preparation	Analytical	Analytical
Identification	Identification	Date	Type	Identification	Lot	Method	Date	Method	Date
LABQC	VO01E25Q	NA	MB	VO01E25Q	VO01E25	SW5030B	05/23/05	SW8260B	05/23/05
LABQC	VO01E25L	NA	LCS	VO01E25L	VO01E25	SW5030B	05/23/05	SW8260B	05/23/05
LABQC	VO01E25C	NA	LCD	VO01E25C	VO01E25	SW5030B	05/23/05	SW8260B	05/23/05
E-11	TEAD-05-05-E11-WF	05/12/05	N	E112-08N	VO01E25	SW5030B	05/23/05	SW8260B	05/23/05
E-01	TEAD-05-05-E1-WF	05/12/05	N	E112-09N	VO01E25	SW5030B	05/23/05	SW8260B	05/23/05
E-12	TEAD-11-05-05-E12-WF	05/11/05	N	E090-11R	VO01E25	SW5030B	05/23/05	SW8260B	05/23/05
E-12	TEAD-11-05-05-E12-WF	05/11/05	MS	E090-11U	VO01E25	SW5030B	05/23/05	SW8260B	05/23/05
E-12	TEAD-11-05-05-E12-WF	05/11/05	MSD	E090-11V	VO01E25	SW5030B	05/23/05	SW8260B	05/23/05
LABQC	VO94E10Q	NA	MB	VO94E10Q	VO94E10	SW5030B	05/18/05	SW8260B	05/18/05
LABQC	VO94E10L	NA	LCS	VO94E10L	VO94E10	SW5030B	05/18/05	SW8260B	05/18/05
LABQC	VO94E10C	NA	LCD	VO94E10C	VO94E10	SW5030B	05/18/05	SW8260B	05/18/05
EFF	TEAD-05-05-EFF-WF	05/12/05	N	E112-11	VO94E10	SW5030B	05/18/05	SW8260B	05/18/05
FIELDQC	120505TB01	05/12/05	TB	E112-01	VO94E10	SW5030B	05/18/05	SW8260B	05/18/05
LABQC	VO94E12Q	NA	MB	VO94E12Q	VO94E12	SW5030B	05/19/05	SW8260B	05/19/05
LABQC	VO94E12L	NA	LCS	VO94E12L	VO94E12	SW5030B	05/19/05	SW8260B	05/19/05
LABQC	VO94E12C	NA	LCD	VO94E12C	VO94E12	SW5030B	05/19/05	SW8260B	05/19/05
E-13	TEAD-05-05-E13-WF	05/12/05	N	E112-02R	VO94E12	SW5030B	05/19/05	SW8260B	05/19/05
E-14	TEAD-05-05-E14-WF	05/12/05	N	E112-03R	VO94E12	SW5030B	05/19/05	SW8260B	05/19/05
E-15	TEAD-05-05-E15-WF	05/12/05	N	E112-07R	VO94E12	SW5030B	05/19/05	SW8260B	05/19/05
LABQC	VO94E15Q	NA	MB	VO94E15Q	VO94E15	SW5030B	05/20/05	SW8260B	05/20/05
LABQC	VO94E15L	NA	LCS	VO94E15L	VO94E15	SW5030B	05/20/05	SW8260B	05/20/05
LABQC	VO94E15C	NA	LCD	VO94E15C	VO94E15	SW5030B	05/20/05	SW8260B	05/20/05
INF	TEAD-05-05-INF-WF	05/12/05	N	E112-10N	VO94E15	SW5030B	05/20/05	SW8260B	05/20/05

E090-01

VO94E15

SW5030B

05/20/05

SW8260B

05/20/05

TB

05/11/05

FIELDQC

TEAD-11-05-05-TB-01

TABLE B-3

SAMPLE PREPARATION BATCH SUMMARY MAY 2005

SWMU 2-TOOELE ARMY DEPOT, UTAH

(Page 2 of 2)

Location	Field Sample	Sample	Sample	Laboratory	Preparation	Preparation	Preparation	Analytical	Analytical
Identification	Identification	Date	Type	Identification	Lot	Method	Date	Method	Date
LABQC	VO94E16Q	NA	MB	VO94E16Q	VO94E16	SW5030B	05/20/05	SW8260B	05/20/05
LABQC	VO94E16L	NA	LCS	VO94E16L	VO94E16	SW5030B	05/20/05	SW8260B	05/20/05
LABQC	VO94E16C	NA	LCD	VO94E16C	VO94E16	SW5030B	05/20/05	SW8260B	05/20/05
E-02-1	TEAD-11-05-05-E2.1-WF	05/11/05	N	E090-10	VO94E16	SW5030B	05/21/05	SW8260B	05/21/05
E-02-2	TEAD-11-05-05-E2-2-WF	05/11/05	N	E090-08	VO94E16	SW5030B	05/20/05	SW8260B	05/20/05
E-02-2	TEAD-11-05-05-S-E2-2-WF	05/11/05	FD	E090-09	VO94E16	SW5030B	05/20/05	SW8260B	05/20/05
FD	Field duplicate.		MB	Method blank.		N	Investigative sar	mple.	
LCD	Laboratory control sample duplicate		MS	Matrix spike.		TB	Trip blank.		
LCS	Laboratory control sample.		MSD	Matrix spike dupl	icate.				

TABLE B-4

HOLDING TIME SUMMARY SWMU 2, MAY 2005 QUARTERLY SAMPLING TOOELE ARMY DEPOT, UTAH

(Page 1 of 1)

Location	Field Sample	Laboratory	Sample	Analysis	Preparation	Analysis	Analysis	Method
Identification	Identification	Identification	Date	Method	Date	Date	Holding Time	Holding Time
E-01	TEAD-05-05-E1-WF	E112-09N	05/12/05	SW8260B	05/23/05	05/23/05	11	14
E-02-1	TEAD-11-05-05-E2.1-WF	E090-10	05/11/05	SW8260B	05/21/05	05/21/05	10	14
E-02-2	TEAD-11-05-05-E2-2-WF	E090-08	05/11/05	SW8260B	05/20/05	05/20/05	9	14
E-02-2	TEAD-11-05-05-S-E2-2-WF	E090-09	05/11/05	SW8260B	05/20/05	05/20/05	9	14
E-11	TEAD-05-05-E11-WF	E112-08N	05/12/05	SW8260B	05/23/05	05/23/05	11	14
E-12	TEAD-11-05-05-E12-WF	E090-11R	05/11/05	SW8260B	05/23/05	05/23/05	12	14
E-13	TEAD-05-05-E13-WF	E112-02R	05/12/05	SW8260B	05/19/05	05/19/05	7	14
E-14	TEAD-05-05-E14-WF	E112-03R	05/12/05	SW8260B	05/19/05	05/19/05	7	14
E-15	TEAD-05-05-E15-WF	E112-07R	05/12/05	SW8260B	05/19/05	05/19/05	7	14
EFF	TEAD-05-05-EFF-WF	E112-11	05/12/05	SW8260B	05/18/05	05/18/05	6	14
FIELDQC	120505TB01	E112-01	05/12/05	SW8260B	05/18/05	05/18/05	6	14
FIELDQC	TEAD-11-05-05-TB-01	E090-01	05/11/05	SW8260B	05/20/05	05/20/05	9	14
INF	TEAD-05-05-INF-WF	E112-10N	05/12/05	SW8260B	05/20/05	05/20/05	8	14

TABLE B-5

METHOD BLANK DATA SUMMARY SWMU 2, MAY 2005 QUARTERLY SAMPLING TOOELE ARMY DEPOT, UTAH

(Page 1 of 1)

Lab San	nple Identification Extraction Code Extraction Date Analysis Code Analysis Date	VO94E10Q SW5030B 5/18/2005 SW8260B 5/18/2005	VO94E12Q SW5030B 5/19/2005 SW8260B 5/19/2005	VO94E15Q SW5030B 5/20/2005 SW8260B 5/20/2005	VO94E16Q SW5030B 5/20/2005 SW8260B 5/20/2005	VO01E25Q SW5030B 5/23/2005 SW8260B 5/23/2005
Volatile Organic Compour	nds (µg/l)					
1,1,1-Trichloroethane		<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane		<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane		<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane		<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene		<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene		<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene		<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene		<1.0	<1.0	<1.0	<1.0	<1.0
Benzene		<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane		<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform		<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane		<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride		<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene		<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane		<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform		<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
cis-1,3-Dichloropropene		<1.0	<1.0	<1.0	<1.0	<1.0
Dibromochloromethane		<1.0	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoromethane		<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene		<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloroethene (PCE)		<1.0	<1.0	<1.0	<1.0	<1.0
Toluene		<1.0	<1.0	<1.0	<1.0	<1.0
Total 1,2-Dichloroethene		<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,3-Dichloropropene	•	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene (TCE)		<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane		<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Xylenes, Total		<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate (%)	<u>Limit</u>					
1,2-Dichloroethane-d4	70 - 130	113	110	96	97	107
1-Bromo-4-fluorobenzene	70 - 130	114	102	83	83	101
Toluene-D8	70 - 130	112	106	98	98	97

 $\mu g/l$ micrograms per liter.

TABLE B-6

TRIP BLANK DATA SUMMARY SWMU 2, MAY 2005 QUARTERLY SAMPLING TOOELE ARMY DEPOT, UTAH (Page 1 of 1)

Field Sample Ide Date	ntification Collected	TEAD-11-05-05-TB-01 5/11/2005	120505TB01 5/12/2005
Analyte/Methods (Units)			
Volatile Organic Compounds/SW8260	B (μg/l)		
1,1,1-Trichloroethane		<1.0	<1.0
1,1,2,2-Tetrachloroethane		<1.0 UJ	<1.0
1,1,2-Trichloroethane		<1.0	<1.0
1,1-Dichloroethane		<1.0	<1.0
1,1-Dichloroethene		<1.0	<1.0
1,2-Dichlorobenzene		<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0
1,3-Dichlorobenzene		<1.0	<1.0
1,4-Dichlorobenzene		<1.0	<1.0
Benzene		<1.0	<1.0
Bromodichloromethane		<1.0	<1.0
Bromoform		<1.0	<1.0
Bromomethane		<1.0	<1.0
Carbon tetrachloride		<1.0	<1.0
Chlorobenzene		<1.0	<1.0
Chloroethane		<1.0	<1.0
Chloroform		<1.0	<1.0
Chloromethane		<2.0	< 2.0
cis-1,3-Dichloropropene		<1.0	<1.0
Dibromochloromethane		<1.0	<1.0
Dichlorodifluoromethane		<1.0	<1.0
Ethylbenzene		<1.0	<1.0
Methylene chloride		< 5.0	< 5.0
Tetrachloroethene (PCE)		<1.0	<1.0
Toluene		<1.0	<1.0
Total 1,2-Dichloroethene		<1.0	<1.0
trans-1,3-Dichloropropene		<1.0	<1.0
Trichloroethene (TCE)		<1.0	<1.0
Trichlorofluoromethane		<1.0	<1.0
Vinyl chloride		<2.0	< 2.0
Xylenes, Total		<1.0	<1.0
Surrogate (%)	<u>Limit</u>		
1,2-Dichloroethane-d4 7	0 - 130	90	107
1-Bromo-4-fluorobenzene 7	0 - 130	79	104
Toluene-D8 7	0 - 130	86	105

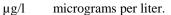
 $\mu g/l$ micrograms per liter.

UJ Potential low bias, possible false negative.

FIELD DUPLICATE DATA SUMMARY SWMU 2, MAY 2005 QUARTERLY SAMPLING TOOELE ARMY DEPOT, UTAH

(Page 1 of 1)

	ation Identification mple Identification Sample Type Date Collected	E-02-2 TEAD-11-05-05-E2-2-WF Parent 5/11/2005	E-02-2 Dup TEAD-11-05-05-S-E2-2-WF Field Duplicate 5/11/2005	RPD
Volatile Organic Compounds	s/SW8260B (µg/l)			
1,1,1-Trichloroethane		<1.0	<1.0	NC
1,1,2,2-Tetrachloroethane		<1.0	<1.0	NC
1,1,2-Trichloroethane		<1.0	<1.0	NC
1,1-Dichloroethane		0.22 T	<1.0	NC
1,1-Dichloroethene		<1.0 UJ	<1.0 UJ	NC
1,2-Dichlorobenzene		<1.0	<1.0	NC
1,2-Dichloroethane		<1.0	<1.0	NC
1,2-Dichloropropane		<1.0	<1.0	NC
1,3-Dichlorobenzene		<1.0	<1.0	NC
1,4-Dichlorobenzene		<1.0	<1.0	NC
Benzene		<1.0 UJ	<1.0 UJ	NC
Bromodichloromethane		<1.0	<1.0	NC
Bromoform		<1.0	<1.0	NC
Bromomethane		<1.0	<1.0	NC
Carbon tetrachloride		0.58 T	0.49 T	16.82
Chlorobenzene		<1.0	<1.0	NC
Chloroethane		<1.0	<1.0	NC
Chloroform		<1.0	<1.0	NC
Chloromethane		<2.0	<2.0	NC
cis-1,3-Dichloropropene		<1.0	<1.0	NC
Dibromochloromethane		<1.0	<1.0	NC
Dichlorodifluoromethane		<1.0	<1.0	NC
Ethylbenzene		<1.0	<1.0	NC
Methylene chloride		<5.0	<5.0	NC
Tetrachloroethene (PCE)		<1.0	<1.0	NC
Toluene		<1.0	<1.0	NC
Total 1,2-Dichloroethene		<1.0	<1.0	NC
trans-1,3-Dichloropropene		<1.0	<1.0	NC
Trichloroethene (TCE)		18	17	5.71
Trichlorofluoromethane		<1.0	<1.0	NC
Vinyl chloride		<2.0	<2.0	NC
Xylenes, Total		<1.0	<1.0	NC
Surrogate (%)	<u>Limit</u>	1210	110	1,0
1,2-Dichloroethane-d4	70 - 130	107	95	11.88
1-Bromo-4-fluorobenzene	70 - 130	92	78	16.47
Toluene-D8	70 - 130	108	93	14.93



Bold Bolded result indicates positively identified compound.

NC Not calculated.

T Analyte was positively identified but the reported concentration is estimated; reported concentration is less than the reporting limit, but greater than the method detection limit.

UJ Potential low bias, possible false negative.

RPD Relative percent difference.

TABLE B-8

MATRIX SPIKE / MATRIX SPIKE DUPLICATE DATA SUMMARY
SWMU 2, MAY 2005 QUARTERLY SAMPLING
TOOELE ARMY DEPOT, UTAH
(Page 1 of 1)

	cation Identification Sample Identification Sample Type Date Collected	E-12 TEAD-11-05-05-E12-WF Parent 5/11/2005	E-12 TEAD-11-05-05-E12-WF Matrix Spike 5/11/2005	E-12 TEAD-11-05-05-E12-WF Spike Duplicate 5/11/2005	RPD
Volatile Organic Compound	ls/				
SW8260B (μg/l)	<u>Limit</u>				
1,1-Dichloroethene	70 - 130	<1.0	91	85	6.82
Benzene	70 - 130	<1.0	93	90	3.28
Chlorobenzene	70 - 130	<1.0	97	94	3.14
Toluene	70 - 130	<1.0	95	91	4.30
Trichloroethene (TCE)	70 - 130	<1.0	95	91	4.30
Surrogate (%)					
1,2-Dichloroethane-d4	70 - 130	114	112	112	0.00
1-Bromo-4-fluorobenzene	70 - 130	100	96	95	1.05
Toluene-D8	70 - 130	97	101	102	0.99

 μ g/l micrograms per liter.

RPD Relative percent difference.

TABLE B-9

LABORATORY CONTROL SAMPLE / LABORATORY DUPLICATE SAMPLE DATA SUMMARY SWMU 2, MAY 2005 QUARTERLY SAMPLING TOOELE ARMY DEPOT, UTAH (Page 1 of 2)

Lat Analyte (Units)	Sample Identification Sample Type Extraction Code Extraction Date Analysis Code Analysis Date	VO94E10L LCS SW5030B 5/18/2005 SW8260B 5/18/2005	VO94E10C LCD SW5030B 5/18/2005 SW8260B 5/18/2005	VO94E12L LCS SW5030B 5/19/2005 SW8260B 5/19/2005	VO94E12C LCD SW5030B 5/19/2005 SW8260B 5/19/2005	VO94E15L LCS SW5030B 5/20/2005 SW8260B 5/20/2005
Volatile Organic Compound	s (%) <u>Limit</u>					
1,1-Dichloroethene	80 - 120	83	86	89	94	84
Benzene	80 - 120	85	87	92	96	88
Chlorobenzene	80 - 120	91	93	93	100	105
Toluene	80 - 120	90	93	95	99	97
Trichloroethene (TCE)	80 - 120	95	99	102	106	114
Surrogate (%)						
1,2-Dichloroethane-d4	70 - 130	95	104	106	103	98
1-Bromo-4-fluorobenzene	70 - 130	97	<u>138</u>	105	99	87
Toluene-D8	70 - 130	97	105	109	108	95

<u>Bold</u> Bolded and underlined result indicates quality control data outside acceptance criteria.

LCS Laboratory control sample.

LCD Laboratory control duplicate.

TABLE B-9

LABORATORY CONTROL SAMPLE / LABORATORY DUPLICATE SAMPLE DATA SUMMARY SWMU 2, MAY 2005 QUARTERLY SAMPLING TOOELE ARMY DEPOT, UTAH (Page 2 of 2)

Lab Sa Analyte (Units)	mple Identification Sample Type Extraction Code Extraction Date Analysis Code Analysis Date	VO94E15C LCD SW5030B 5/20/2005 SW8260B 5/20/2005	VO94E16L LCS SW5030B 5/20/2005 SW8260B 5/20/2005	VO94E16C LCD SW5030B 5/20/2005 SW8260B 5/20/2005	VO01E25L LCS SW5030B 5/23/2005 SW8260B 5/23/2005	VO01E25C LCD SW5030B 5/23/2005 SW8260B 5/23/2005
Volatile Organic Compounds (%	(6) <u>Limit</u>					
1,1-Dichloroethene	80 - 120	89	<u>79</u>	82	88	83
Benzene	80 - 120	94	<u>78</u>	80	101	95
Chlorobenzene	80 - 120	110	95	93	104	102
Toluene	80 - 120	104	87	87	102	97
Trichloroethene (TCE)	80 - 120	<u>123</u>	100	104	102	98
Surrogate (%)						
1,2-Dichloroethane-d4	70 - 130	95	96	93	113	111
1-Bromo-4-fluorobenzene	70 - 130	83	86	82	97	96
Toluene-D8	70 - 130	100	91	95	100	100

<u>Bold</u> Bolded and underlined result indicates quality control data outside acceptance criteria.

LCS Laboratory control sample.

LCD Laboratory control duplicate.